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THE
RUBBER AGE

VOL. XII. NOVEMBER 10, 1922 No. 3

SCIENTIFIC MANAGEMENT FOR RUBBER MANUFACTURERS

Labor Wages - IX.

By Alfred Baruch

Consulting Industrial Engineer, New York

THE discussion of rates or standards brings us to a consideration of the various methods of wage payment and the problems that arise in connection with this phase of management. The question of wages and the method of arriving at a satisfactory standard has caused more difficulty than any other element of management. The reason for this is that we are now dealing with human beings instead of equipment and material, and a factor is introduced over which the management can never exercise complete control. It is this phase of scientific management that has aroused the bitterest antagonism on the part of labor unions and social workers and even on the part of managers who struck an attitude of high moral indignation which served as an excellent defense for any criticism of the slovenly methods by which they were doing business. Therefore, it is clear that this issue must be treated frankly and permits no mincing of terms.

HOW SHALL LABOR BE PAID?

The author shows in this article that there are two fundamental methods of payment: Day wages and piece work.

By the first method the employer buys the worker's time, and the worker sells his services and must put forth his best efforts to earn the daily stipend.

By the second method the worker capitalizes his skill in producing the largest number of acceptable complete pieces daily or weekly, and is paid accordingly.

The Halsey, Taylor, Gantt, Emerson, and Time Bonus plans of wage payments are described and criticized.

As a matter of fact, the point of view of management engineers from Taylor down has never been quite understood in this matter. Taylor took the position, as have others since then, that it is first necessary to remove all obstacles from the path of the worker and that, once this is done, a systematic method of getting the maximum production from a man through a scientifically designed wage system may be introduced with safety.

The difficulty has been that greedy managers saw in this scientifically designed wage plan just one more opportunity to force higher production out of labor without taking any of the steps preparatory to this procedure. It takes no great stretch of imagination to see the effect of such a scheme upon wage earners. The whole burden of production was put on them. Even in plants where the management set up a liberal piece rate this was unfair, because the piece rate was always based upon normal conditions and the carelessness of the management threw the operation of the plant into an abnormal state most of the time. Elsewhere in this series the writer has made the statement that about four-fifths of the responsibility in connection of the operation of a plant rested squarely on the shoulders of the management. The management has to build the plant, buy the equipment, lay it out and install it, purchase the material, and plan the work. It has to provide the worker with material, tools, and definite instructions on what must be done. The only function of labor is to perform the work. It is unfair to base wages on the scale of a plant running smoothly—no machine breakdowns, no delays in the delivery of material, and no lack of orders—if these conditions exist.

Obstacles Can Be Removed

It is the custom with most managers to ascribe any interference with the original schedule as a part of the mysterious ways of Providence, and to let it go at that. Taylor, his associates, and his successors have demonstrated beyond the shadow of a doubt that such delays and interferences are avoidable through proper planning, and that leaving such things to chance when they may be made a dead certainty is dishonest. Labor may complain with a great deal of justification when it is forced to make extra efforts under such conditions. There is never a complaint, and there never has been, where labor is given an opportunity to do the best it can with all obstacles removed.

Serious as this condition is from the point of view of human relations, it is even more serious on the side of the management in that it threatens the very existence of the industry as it is now organized. A striking illustration of the consequences of a ruthless exploitation of labor, with no effort on the part of the management to remove obstacles and to make conditions of work easy so that the wage earner does not have to pay for the inefficiency of his employer, may be found in the situation that exists in the clothing industry of New York today. The efforts on the part of employers in that industry to force the workers into ever-increasing production, through cuts in wages and without making compensating improvements in the condition of work, have driven the workers into an organization that has become powerful enough to dictate all conditions under which its members shall work.

Here are some of the conditions: After one week's trial of an employee the employer loses all right of discharge over him, the theory being that if the man is inefficient or unfit

he will disclose these characteristics in the first week. No piece rate plan of wage payment or any modification of it, such as the task and bonus systems which will be discussed later, may be introduced. All wages are paid on a straight per diem basis whether the worker comes up to the promises made in the first week or not. All workers doing the same class of work are paid exactly the same rate without distinction as to ability, output, or effort.

The result can easily be imagined. Sabotage of the very worst kind is rife and the employers are unable to defend themselves against it. One of the workmen in each shop is elected as chairman and he decides whether there is enough work in the shop to keep all the men going. The employer may not lay off anyone without the chairman's permission. Now this organization is about to enforce a rule that each shop must pay the men for a minimum of about five-sixths of the possible working time in a year, regardless of whether they actually work this time or not. As this is a seasonable industry, this rule means that the employers must actually guarantee the men wages for a part of the time when there is sure to be no work.

Of course, everyone will recognize this as the horrible example. There is no warrant for thinking that this same situation exactly will be duplicated in other fields. But it is a safe guess that the tendency will be in this direction unless the management accepts its responsibilities seriously and takes steps to remove obstacles from the path of labor before it attempts to enforce any method of wage payment that is designed to stimulate the workers to greater efforts.

The Fundamental Bases of Wage Payment

There are two fundamental methods by which labor may be paid and all other plans are modifications of these two. The first is the payment on the basis of time; the second is the payment on the basis of work done.

The theory behind the first method is that the employer buys the worker's time and sells it at a profit to himself. The worker is asked to be on hand for a given number of hours each day and to do any work that may be assigned to him during this time. No stipulation is made as to the quantity of his output. He must put forth his best efforts and the tenure of his position depends on the extent to which he succeeds in doing this in the opinion of his employer. It is assumed that all workers doing the same class of work will turn out equal quantities of product. If one produces less, the loss is the employer's; if another produces more, the employer takes the gain.

This method is used in all cases where the worker does not perform uniform operations and where a piece rate cannot very well be set. An illustration of this type of work may be found in the maintenance department where the men do a variety of work from day to day and where it is impossible to establish a piece rate that will be equitable. It is used in plants where the employer does not know how to arrive at a piece rate and resorts to the day wage as the path of least resistance. This method is also used where the unions have become strong enough to insist on a day wage after an experience with piece rates which convinces them that the latter method of payment is nothing but a hellish invention to gouge the worker. There are circumstances under which this conclusion is absolutely justified. The way in which piece rates may be established with justice to both the worker and the employer will be taken up later. The immediate discussion will concern itself with the fundamental nature of piece work.

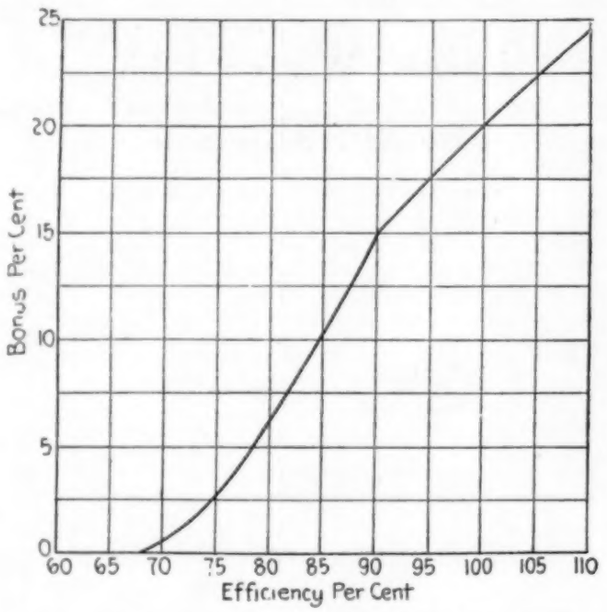

FIG. 1—EMERSON'S TASK AND BONUS CHART. WORKER IS REWARDED FOR PERFORMING THE ASSIGNED TASK OR EXCEEDING IT, BUT IS NOT PENALIZED IF HE FALLS SHORT

Piece work is opposed to the day wage in theory. The worker is supplied with tools, material, and instructions. He performs the necessary operations and gets paid a fixed price per piece for his efforts. In other words, he sells his ability to do the work as measured by the number of good pieces that he turns out. Thus he gets paid for the quantity of work he does and not for the time he spends in doing it.

A piece rate can be established, of course, only where the operations are uniform and repetitive. The operations may be long or short according to their nature. As a general rule, piece rates can be established for productive labor while day wages must be used for indirect labor.

Advantages and Disadvantages of Each Method

The day wage method of rewarding labor is advantageous under certain conditions. Where the factory is small and the men work under the immediate supervision of their employer it is possible to pay men by this method without loss to either side. A shop of this sort constitutes a small family and the employer is able to keep in close personal touch with the affairs of each man. The wage agreement in this case is not made strictly under the law of supply and demand. The employer knows the men who have been faithful to his interests and also those who have thrown their lot with him and who need special considerations because of the burden they have to carry. He also knows the men who do the best work and can reward them accordingly.

As soon as the factory expands, however, to the point where the employer has to delegate the task of hiring men to one of his subordinates, the personal contact is at once destroyed. This man, whether he is the factory superintendent or the employment manager, no matter how kind his inclinations are, must take the attitude that he is buying a commodity just as the purchasing agent buys material and he must secure the best terms possible for his employer in order to maintain his own standard of efficiency and to insure the tenure of his position. Here the question of wages is placed on the basis of supply and demand, pure and simple. A tire builder may be ever so skilful, but if the prevailing rate for his class of work is $8 per day, he will get that wage and no other. In a large organization the day wage worker is of necessity treated as a commodity and not as a human being surrounded by special circumstances and worthy of special consideration.

On the other hand, the employer too suffers from this system when the workers get beyond his immediate supervision. As long as he is in the shop himself and is watching the efforts of each individual it is difficult for any one of the men to restrict his output and have the employer believe that he is doing his best, because the employer is usually a practical worker himself and knows what it is all about. But as soon as large machine tools are introduced and one worker does as much as five or ten did before it becomes impossible to keep check on his efforts unless someone stands over him all the time. As the worker is assured his income regardless of the number of pieces he turns out, the temptation to soldier on the job becomes very great. Even when the man is inclined to do his level best he is sure to be held back by his fellow workmen who at once raise the cry that he is setting a killing pace. This man has to live in close proximity to his

fellows while he has almost no contact with his emp'oyer. It is much easier for him to fall in line with the rest than to attempt to swim against the tide.

Piece Rates

Since day wages as a means of labor reward proved unsatisfactory to both the worker and the employer, it was natural to turn to some other method. The only other alternative that suggested itself at first was the piece rate method. This would seem fair to all since it enabled the worker to earn an income that was proportionate to his skill and the amount of effort he expended. It permitted the employer to get the maximum return on his investment in machinery and equipment, since each man would naturally be inclined to do his level best in order to make more money. The piece rate method also saved the employer considerable money since less supervision is required. The workers are paid for their good pieces only, and they are much more careful when they realize that spoiled work is just so much lost time. The tables developed by Professor Kimball in his book *Industrial Organizations* are of great interest in this connection. They show the decline in the cost per unit with increasing effort on the part of the workman. The table given below is designed after his charts:

EARNINGS AND COSTS UNDER THE PIECE RATE PLAN

Number of tires per day	Material Cost	Workman's Earnings
6	$ 60.	$ 6.
7	70.	7.
8	80.	8.
9	90.	9.
10	100.	10.

Machine Burden	Total Dept. Cost	Cost per Tire
$6.	$ 72.	$12.00
6.	83.	11.85
6.	94.	11.75
6.	105.	11.67
6.	116.	11.60

The above chart shows a saving per tire or $0.40. If the plant turns out 1000 tires per day, it has saved $400.00, each man has raised his pay by $4.00 per day, and the employer received indirect benefits in addition, because his equipment was used to its full capacity and less time was taken to supervise the manufacture of a given number of tires.

Unfortunately, many abuses crept in to destroy the value of this system. For some strange reason employees have always had the feeling that their labor must earn a given amount per day. As soon as a piece worker through extra effort surpassed that figure the employer began to get uneasy and to feel that the worker was getting more than was coming to him. This started the practice of cutting piece rates which has been one of the most fruitful sources of trouble in our industrial history. In many cases the employer was justified because the piece rate was set unscientifically and it became apparent that the work was easier to do than had been anticipated. Consequently, the rate was set too high. Then, too, the workers would hold back production purposely while the rate was being set in order to secure higher rates.

Whatever the reason for it, whenever a cut was made it aroused bitter antagonism on the part of the workers. They had the feeling that they had been tricked into extra effort so that the employer could get more production from them and cut the rate until they were earning no more than they had before. Some employers were not above hiring the most skilful men available at very high wages to come into the plant and establish the basis for an extremely low piece rate by working at a terrific pace for a short period. The number of pieces turned out by these experts during this time was used as the basis for establishing the wages that all workers, skilled, mediocre, and poor, were to get for all time.

This soon drove the workers into official and unofficial organizations that established the number of pieces that were to be produced per day regardless of the rate. The result was that skilled workers would restrict their output to that of the slowest and most unskilled men in the shop. Distrust of employers was prevalent and any man who tried to bolster his income by increasing his output was regarded as a traitor and soon forced out of the industry by his fellow workmen. In fact, these pace-makers were the cause of so much trouble that the employers themselves began to hesitate about taking them into their shops.

These conditions gave the students of industrial problems much trouble. There was much to be desired in the method of wage payment then in use. The workers objected to the piece rate method on the ground that it left them without an assured income. Labor leaders claim that piece work awakened the greed of the workers and brought about a hostile spirit of competition that was destructive to morale and fellow-feeling. Another objection often put forward was that the piece work method increased production to such an extent that it glutted the market and finally threw the men themselves out of work.

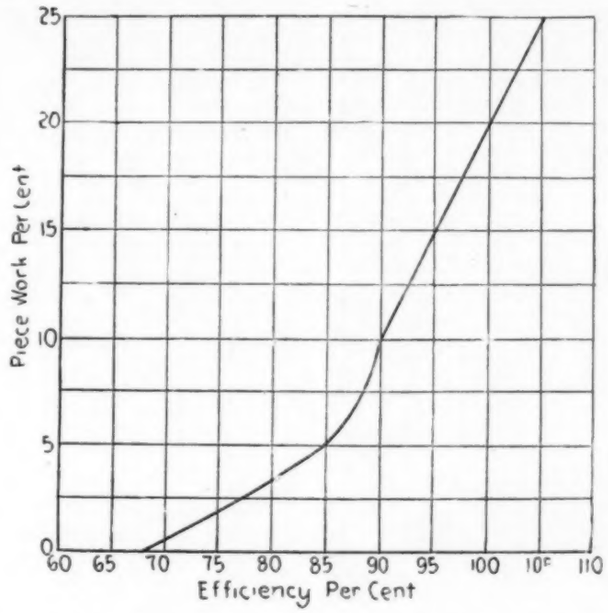

FIG. 2—NORMAL PIECE RATE CHART. THERE IS NO REDUCTION IN THE RATE NO MATTER HOW MUCH THE WORKER DOES, BUT HE GETS ONLY WHAT HE MAKES

There was enough of truth in all of these objections to force industrial managers to look about for some other method of reward that would be satisfactory to both employer and employee. The solutions that were offered by industrial engineers were a compromise between the two fundamental methods. The first plan that attempted to retain the good features of both systems while eliminating the objectionable ones was devised by F. A. Halsey. The following is Kimball's description of this plan:

The Halsey Premium Plan

"Under this plan it is optional with the workman whether he elects to work on the premium plan or not and his day's pay is assured to him whether he earns a premium or not, provided, of course, that he is not so incompetent as to be undesirable. Under this plan a standard time, based on previous experience, is allowed for the work in question. For every hour that the workman can shorten his time he is paid a fraction of his hourly wage as a premium. In Mr. Halsey's original illustration the fraction selected is one third; but, as he points out, this is a question that must be settled by good judgment. In practice it varies from one-quarter to one-half of the hourly wage. Thus, suppose a job normally requires ten hours to complete, and the workman's pay is three dollars for the ten hours. If he can reduce the time of the work to eight hours his premium will be $\frac{2 \times 30}{3} = 0.20$ and his earnings for the eight hours will be $(8 \times 0.30) =$ $2.40 or at the rate of $.3.25 per day of ten hours. The labor cost to the employer is, therefore, $0.40 less than on day work."

"Reverting to the illustration used in the piece work table, the man would save two-thirds of a day in time and his bonus would be $1.33 1/3, thus making his daily wage $7.33 1/3.

Should he fail to make ten tires he would still receive his base rate of $6 per day."

The chief advantage of the Halsey plan is that it leaves conditions unchanged for those workers who do not wish to avail themselves of the bonus. Every man is guaranteed his base rate. If he wishes to make more than that he must increase his output over the standard set by his employer as a normal day's work.

As may readily be seen, this plan is a modification of the piece rate system of wage payment. The chief differences are that the man is guaranteed a fixed amount for wages regardless of his output and that whatever he earns over the base is not paid to him at the same rate that his daily wages are. In some rubber plants a base rate is guaranteed even where the man is on a piece rate basis, so that this point of difference is lost.

Under this type of piece rate payment the management assumes that each man is capable of earning a fixed amount and that if he does not do so, the causes for it lie beyond his control and he should not therefore be penalized. Another reason for establishing the base rate under the piece rate system is a humanitarian or sociological one. The base rate is the minimum on which a man may live and not be compelled to lower his standards of living. It has many advantages, since it enables the new worker to learn how to do his work skilfully while he earns enough to warrant his holding the job. This method is also convenient because it permits the management to switch the men to new or irregular work without rousing their antagonism.

The Taylor Plan

The Taylor plan of wage payment is a differential piece rate. A standard is set as before for a fixed number of pieces per day. If the worker fails to attain the standard he is paid less per piece than if he reaches it. If he exceeds the standard he is paid more than the standard rate per piece. For example, assume that a tire builder gets one dollar per carcass for every one he builds, provided that he builds eight per day. Under the Taylor plan, if he builds seven per day, he would get ninety cents per piece while if he builds nine per day; he would get one dollar and ten cents per piece.

It is important to note in this connection that Taylor recommended the introduction of this system of wage payment only after exhaustive time studies had been made so as to determine the minimum time required for each operation and after the whole plant had been placed on the basis of scientific management and all obstacles had been removed from the path of the worker. In addition he is surrounded by expert instructors who give him the benefit of their special knowledge to enable him to achieve the standard. The plan is based on the theory that every man should produce a normal day's work or else pay a penalty for his failure to do so. On the other hand, if the man exceeds the normal, he must be given an additional reward for making the extra effort.

The Taylor plan has been objected to on the ground that it destroys a worker's initiative. It pays him good wages because its author believes that low wages and cheap product do not go together. But it leaves nothing to the worker's imagination since it places him under the immediate supervision of experts who have specialized in a particular phase of production such as the machine, the method, or the inspection of the product. As a matter of fact, the standardization and specialization of machinery has already done this for the worker so that he is usually employed in doing the same thing the same way all day long. Take a carcass builder as an example. The only difference between one whose initiative has been destroyed by expert instruction and supervision, and one whose individuality has been preserved by the absence of such instruction, is that the former has been taught good tire-building habits while the latter may have acquired bad ones. It is all a question of habit in performing the same operations.

The Gantt Bonus Plan

Under this method each man is assigned a definite task and given a fixed time in which to perform it. If he does not finish the job within the time limit or if he just meets the requirements, he is paid his base rate or a minimum wage. If he performs the task in less than the allotted time he is paid a bonus which is in the same ratio to the base rate that the saved time is to the allotted time. For example, a tire builder may be given an order to build one hundred 34 x 4 carcasses and he is allowed twelve days at eight hours each in which to do it. His base rate is $6.00 per day and if he performs the task in standard time his wages for the twelve days will be $72.00. If he finishes the job in ten days he will have reduced the standard time by one-sixth and therefore earned one-sixth more or $12.00. His pay for the ten days is $72.00

This plan also pre-supposes a very complete analysis of the time required for each operation and the removal of all obstacles, so that the worker may have every opportunity to earn his bonus. It has the same fundamental objections as the Taylor plan, however, in that it divides the workers into two classes—those who can and those who cannot earn the bonus.

The Emerson Efficiency Plan

The Emerson plan guarantees the worker a base rate, sets up a task as in the Gnatt plan, and pays the worker a bonus for any improvement on the standard. But it permits the worker to earn a bonus before he reaches the standard.

It is based on the theory that a man usually operates at about 66 2/3 per cent efficiency. Emerson arrived at this figure through observations covering many years and a great variety of industries. In order for a man to complete his task within the standard time he must already exert himself beyond the customary limits and is therefore entitled to extra compensation. If he goes beyond the standard he is making extraordinary efforts and must be rewarded accordingly.

To return to the previous example of the tire builder who is assigned the task of building one hundred carcasses in ten days: this man will begin to earn a bonus as soon as he has passed the sixty-seventh carcass within the standard time. When he reaches the hundred mark within the allowed time, his bonus is 20 per cent of his pay for the task. If his efficiency based on the Emerson scale goes as high as 140 per cent, his bonus is 60 per cent of his pay.

Time Bonus

The writer has met with the situation in some industries where it was necessary to introduce some sort of a bonus scheme in order to stimulate production and to stabilize the labor cost so as to permit intelligent estimates as to the cost of the product, but where a strong union objected to any form of money bonus. Here a time bonus was introduced where each man was given a fixed task daily. If he performed the full task properly before the end of the day he was permitted to go home as soon as finished. This was outdoor, manual work that required only small tools. Therefore, the problem of idle equipment did not enter into the consideration and it was possible to introduce this method with good effect.

Piece Rate Method Most Satisfactory

Examination of all the above methods will disclose the fact that they are simply modifications of the piece rate method and that they are open to the same criticisms that the piece rate method is. Whenever the rates or tasks or bonuses are based on guesswork, trouble results no matter what method of compensation is used. If the length of operations is based on scientific time study and the entire management is placed on a scientific basis so that all obstacles are removed from the path of the worker, and he is enabled to work at his maximum speed without loss to either himself or his employer, the piece rate method is just as effective as any other and is the fairest both to the employer and the employee.

The plans developed by Taylor and others pre-suppose complete re-organization before they can be put into effect. If this same reorganization took place in any plant piece rate troubles would disappear. After all, the chief source of difficulty is the fact that the employer sets the rate unscientifically and then has to revise and cut down afterward. Without scientific management, piece rates are extremely dangerous. With it, piece rates are highly satisfactory because they reward labor according to its merits and they reward the employer by way of reduced indirect expenses.

British View of Production Restriction Plan

THROUGH the courtesy of Poel & Kelly, Inc., of 347 Madison avenue, New York, and 8 South Broadway, Akron, Ohio, THE RUBBER AGE is enabled to publish the following interesting cablegram received by this firm from Heilbut, Symons & Co., Ltd., of London, regarding the plan of the British Colonial Office to restrict rubber production, the details of which were fully covered in our issue of Oct. 25:

ANALYSIS OF THE PROPOSED RESTRICTION OF THE PRODUCTION OF RUBBER AND A SURVEY OF THE PROBABLE CONSEQUENCES

FOLLOWING ON THE ADOPTION OF THE SCHEME

Section 1—Precise of the Scheme

1. It is intended to stabilize the price of standard ribbed smoked sheets, landed London terms, in the neighborhood of 15 pence.
2. To commence with, every estate under the British flag will be restricted by law to 60 per cent of its production during the period November 1, 1919, and October 31, 1920.
3. This 60 per cent will be modified according to the price obtainable. So long as the price remains below 15 pence it will be reduced by 5 per cent every three months. When the price rises to 15 pence or above it will be increased by 5 per cent for every rise of 3 pence. This will permit 100 per cent production only when the price reaches 3 shillings.
4. Once the exportable percentage has been reduced it will not be increased again unless the price reaches 15 pence, and then only in stages of 5 per cent, e.g., the percentage permitted is 50 per cent. If the price rises to 15 pence the percentage is increased to 55 per cent, not to 65 per cent.
5. The penalties payable on the whole of its output, in the event of over-production, are so prohibitive that it can never pay an estate to exceed its allotment.
6. The Secretary of State for the Colonies will have the power to alter quarterly the percentages stated above. Discussion and delay will thereby be avoided.
7. The majority of British rubber growers owning estates outside the British Empire have given an assurance that they will restrict their output to corespond with the percentages permitted. In the subjoined observations this has not been taken into consideration.

Section 2—Probable Consequences

1. The committee has estimated the world's consumption at 300,000 tons annually. From the latest figures a conservative estimate can safely put the figures at 330,000 tons for 1923.
2. Regarding the production, a full estimate would be 240,000 tons for 1923, apportioned as follows: British—151,000 (60 per cent of 252,000); Dutch 64,000; others 25,000; total 240,000 tons.
3. The price will increase or decrease this quantity by 5 per cent equal to 12,600 tons for every rise or fall of 3 pence from the mean of 15 pence. A price of 3 shillings will therefore produce 252,000 tons again from British possessions.
4. It can safely be assumed that taking the present world's stock into consideration, next year's consumption will be just covered and no more. Very much higher prices, therefore, seem to be inevitable. From this it naturally follows that estates will be extremely loath to sell forward, because—
   (a) They have already sold a fair amount at low prices and will want to average this by dearer sales. (Some may even go so far as to buy in their cheap sales at a small loss in order to be in a position to produce their full allotment, and to sell it at the very much higher prices of the future.
   (b) Of the uncertainty as to further restrictions in the event of the price remaining below 15 pence.
5. Forward business in general will therefore be difficult for some time to come.
6. The consideration which emerges very definitely from a perusal of the committee's report is, that the price must reach 15 pence in the near future, as further and further restrictions will be imposed until it does.
7. The principal aim of the scheme is a method of providing revenue for the states concerned.
   (a) Directly by the penny per pound export duty.
   (b) Indirectly by the ability to pay income tax on the part of prosperous and paying estates.

Rubber Exports $1,500,000 Ahead of 1921

ALTHOUGH the total value of rubber goods exported from the United States declined about $34,000 to $2,788,928 during August, the third consecutive month in which a decrease has occurred, this value is greater by $630,000 than in August, 1921, while for the eight months ending August, 1922, the total value $22,736,110 is nearly $1,500,000 in excess of the corresponding period for 1921. This is distinctly encouraging in view of the lower prices prevailing this year, says Gordon Lee, chief of the Automotive Division of the Department of Commerce.

The increased value of exports in 1922 over 1921 has by no means been uniform. While all branches of the tire trade have enjoyed increased activity and the rubber footwear exports are growing in quantity and holding their own in value, the trade in mechanical rubber goods, druggist's rubber sundries, and other rubber manufactures has decreased in value.

Tire Exports Increased in 1922

Several factors contribute to the increased tire exports for 1922. The tremendous accumulations of stocks in 1920 kept importations in 1921 low in almost every market; these stocks have now been absorbed. The number of automobiles in use is increasing all over the world. American tire companies are going after foreign trade more aggressively. The high quality of American tires is constantly becoming better realized by users everywhere, and recoveries in the exchange rates makes purchase from the United States less difficult for many countries.

Total exports of tire casings for August were 104,835 valued at $1,292,926; solid tires 4,901; value $131,019.

Total exports of inner tubes 97,469; value $172,834.

Total exports of rubber footwear, soles, and heels, pairs, 545,007; value $416,158.

Total exports of rubber belting, hose, packing and thread, pounds, 702,107; value $378,596.

Total exports of hard rubber goods and druggists' rubber sundries, pounds, 126,838; value $97,286.

Shipments of Rubber Manufactures from the United States to Non-Contiguous Territories During the Month of August, 1922

	Belting, hose and packing	Boots and Shoes Pairs		Automobile Tires	All Other Rubber Goods
Alaska	$ 5,606	7,871	$20,292	$ 2,334	$ 1,670
Hawaii	$15,773	6,664	$ 8,162	$61,264	$ 6,577
Porto Rico	$ 5,095	31,597	$22,954	$76,657	$12,317

The Microscopic Examination of Rubber Compounds Containing Antimony Pigments

Convenient Methods of Hardening, Illustrated by Photomicrographs, Are Outlined in this Article

By A. F. Hardman

Research Laboratory of the Kelly-Springfield Tire Company, Cumberland, Maryland

THE pigment that is known to the trade as sulphuret of antimony, or as referred to by the rubber technologist simply as "antimony," is a mixture of widely varying composition. As used in the rubber industry it usually contains varying proportions of antimony penta- and trisulphides, (1) antimony oxysulphide, free sulphur and hydrated calcium sulphate. The last mentioned substance may be presented in quantities up to 50 per cent or more of the total pigment,

FIG. 1

SECTION OF ANTIMONY TUBE TREATED BY S_2Cl_2 METHOD, MAGNIFIED 500 DIAMETERS

serving chiefly as a mere diluent or cheapener. As such it has practically no influence on the color of a rubber compound containing it, due to the fact that, like magnesium carbonate and certain other rubber pigments, its index of refraction is practically identical that of the rubber hydrocarbon.

The size, shape and distribution of these calcium sulphate crystals in the rubber mix, however, is a matter of considerable importance, and one that has received too little notice in the past. But it is a matter of even greater importance that the active reinforcing element of this pigment, the antimony sulphide itself, shall be fine and well distributed. The distribution in particular needs to be emphasized for it has been found that antimony sulphuret, like gas black, has a tendency to form aggregations in the rubber mixture, a fault that must be controlled by proper milling. In view of these facts, it seemed desirable to develop a convenient method for the microscopic examination of compounds containing this pigment, the results of which are outlined below.

Hardening to Obtain Thin Uniform Sections

A rubber compound is at the best a very difficult subject for the microscopist, due to the yielding nature of the material, which makes the preparation of thin uniform sections quite impossible without recourse to some method of hardening. This has been successfully accomplished by Depew and Ruby (2) by freezing with CO_2 and liquid air, an ideal method from the theoretical standpoint but one involving serious practical difficulties, the greatest of which is the expense and difficulty in securing and handling the refrigerating agents. Green (3) has offered the method of hardening previous to sectioning by the use of a dilute solution of sulphur monochloride, a method which leaves little to be desired when applied to most compounds, but which has a definite limit of usefulness when applied to antimony compounds.

Antimony sulphide is a relatively unstable substance and on treatment with S_2Cl_2 promptly reacts with it chemically to form colorless compounds which become quite invisible in the rubber. Just what these compounds are was not investigated but since they are colorless, an ideal section may thereby be obtained for the examination of the calcium sulphate crystals or other pigments present which are not affected by the S_2Cl_2. No further elaboration is necessary on this score, for the technique of this operation is explained fully in the article by Green (3). One additional observation should perhaps be included, that it is usually best to allow the slices of rubber to swell for a few minutes in the pure solvent before introducing into the S_2Cl_2 bath. Such a treatment permits of better penetration by the vulcanizing agent.

Passing on to the consideration of the antimony sulphide itself, it is obvious that a different method of hardening must be employed. Since the treatment with S_2Cl_2 is really a form

FIG. 2

SECTION OF TUBE IN WHICH DIFFERENT GRADE OF ANTIMONY IS EMPLOYED FROM THAT SHOWN IN FIG. 1. NOTE DIFFERENCE IN SIZE AND SHAPE OF CRYSTALS

of vulcanization, it was the logical thing to try to attain the same end using the ordinary vulcanizing agent, that is, sulphur itself. This was found to be successful and may be conveniently carried out in the following manner:

(1) Short, *Jour. Soc. Chem. Ind.*, April 29, 1922, T 109, asserts that the chief sulphur compound is the tetra sulphide.
(2) *Jour. Ind. & Eng. Chem.* 12 (1920) 1156.
(3) *Jour. Ind. & Eng. Chem.* 12 (1921) 1130.

Sulphur Hardening Method

A suitable quantity of sulphur is melted in a small Erlenmeyer flask, which by some automatic heat controlling device is maintained at a temperature of about 135 deg. C. A convenient method of securing this constant temperature is by placing the flask of sulphur in one of the recesses in the top of an ordinary experimental platen press and covering with a piece of wood or other heat insulating material. The temperature of the sulphur in the flask will usually be found to be five or six degrees lower than that registered by the thermometer of the press, and may be regulated accordingly. The rubber samples are prepared by cutting a rectangular piece about ½ by 2 centimeters and from two to three millimeters in thickness from a tube or slab of vulcanized rubber. This is then cut with shears the long way of the piece into four or five segments which still remain attached to each other at one end. The whole is then dropped into the sulphur bath where it is allowed to remain six to eight hours.

The time required to attain the correct degree of hardness varies considerably, depending on the nature of the compound; therefore, at the end of about five hours the piece is removed and one segment broken off, the remainder being returned to the flask for another hour, etc. until the requisite degree of hardness is secured. The segments after removal and cooling are tested for hardness by cutting and flexing, the proper stage

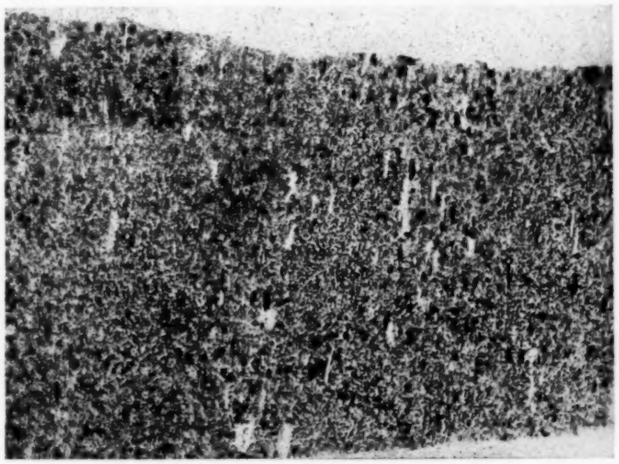

FIG. 3

SECTION OF TUBE CONTAINING ABOUT 20 PER CENT PLASTERED ANTIMONY. MAGNIFIED 150 DIAMETERS

after a few trials being easily recognized. The selected segment is then cut to a thin wedge which at the point must not exceed ½ mm. in thickness, and is embedded in paraffin, sectioned and mounted as described by Green. The writer has found that a binocular microscope using a low power objective is a great convenience in picking out and mounting the sections on the slide. Canada Balsam for antimony compounds is a satisfactory mounting medium.

It is realized that the method as described is not perfect, that as a chemical process it is open to the same objections as the sulphur chloride operation. In fact, the antimony pigments are not wholly unaffected by the prolonged treatment with sulphur, for a few, small rod-shaped black crystals, probably the stable form of Sb_2S_3, are nearly always to be found in these sections. These, however, are of little consequence and may be disregarded in a study of the general dispersion of the pigment.

The advantages of these methods of microscopic study are illustrated in the photomicrographs included here. Fig. 1 is a section of an antimony tube treated by the S_2Cl_2 method. The magnification is 500 diameters. Fig. 2 is a section of another tube quite similar to the first in chemical composition, but with a very different grade of antimony. The difference in the size and shape of the $CaSO_4.2H_2O$ crystals is striking. The magnification is the same as for Fig. 1. Fig. 3 is a tube containing about 20 per cent of plastered antimony. This section was hardened in the sulphur bath and shows clearly the aggregates of antimony sulphide and also many of the calcium sulphate crystals. The magnification is but 150 diameters. Fig.4 and 5 are sections of a tube, treated by the two methods respectively. This tube contains a small amount of zinc oxide and but a trace of $CaSO_4.2H_2O$, crystals of which, however,

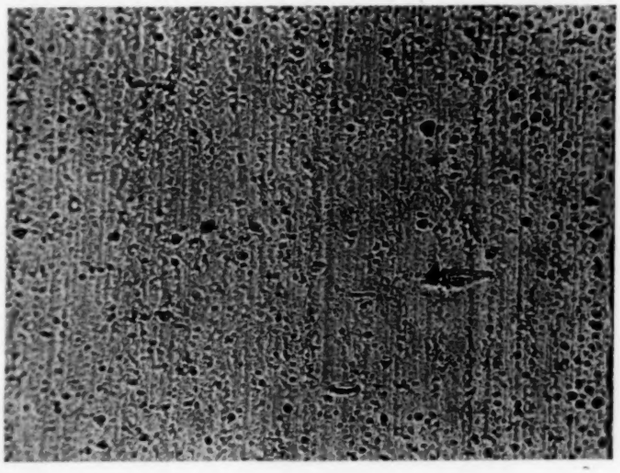

FIG. 4

SECTION OF TUBE HARDENED BY THE SULPHUR CHLORIDE METHOD. MAGNIFIED 500 DIAMETERS

are visible in both sections. The antimony sulphide (Fig. 5) is seen to be well dispersed, evidently a high grade pigment. The magnification is 500 diameter.

Summary

1. The sulphur chloride method of hardening rubber for

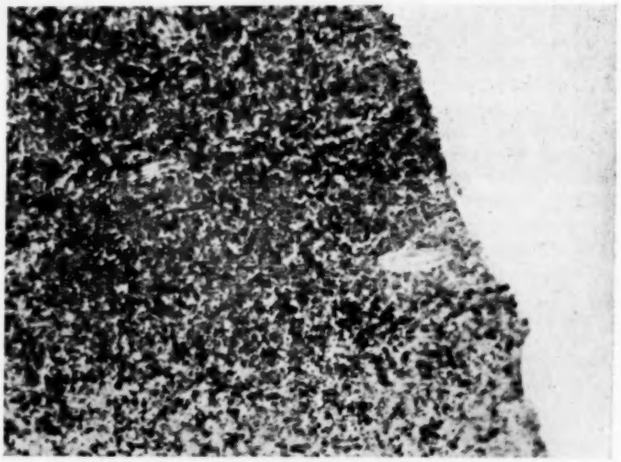

FIG. 5

SECTION OF TUBE HARDENED IN MOLTEN SULPHUR, SHOWING ANTIMONY SULPHIDE WELL DISPERSED. MAGNIFIED 500 DIAMETERS

microsectioning is shown to be excellent for the study of calcium sulphate crystals and other inert pigments in an antimony compound.

2. A new method of hardening in molten sulphur is described, and its application to the antimony sulphide portion of the pigment is pointed out.

3. Photomicrographs illustrating the two methods are shown.

ABSTRACTS

Technical — General — Commercial

Rubberized Fibers

United States Patent No. 1,411,786 relates to a process of producing rubberized fibers by treating the fibers with a water emulsion of rubber, and preferably with the latex of the rubber tree in its original condition. The use of the rubber in the latex condition allows it to penetrate into the innermost structure of the fibers, so that it actually fills up the inner hollow structure of the cotton fiber. Fibers, treated in this manner, have many advantages over rubberized fibers, made by the ordinary process of treatment. The important consideration in making rubberized fibers is to make the joint between the fibers and the rubber as tight as possible, as when this joint is broken, the rubber article rapidly deteriorates. Fibers, treated with rubber latex, have the property of preserving the union between the rubber and the fiber for a comparatively long time.

The rubber latex, mixed with a little ammonia to prevent it from coagulating, is sprayed or flowed on to the surface of traveling threads, yarns, or fabric. The fibers may also be fed into a bath of the latex, and then the water in the latex may be driven off by evaporation. If it is desired vulcanizing and other ingredients are added to the latex and incorporated with the fiber. Dissolved glue or glycerine or oil adapted to soften the resulting rubber may be added to the latex. The process is of importance in the manufacture of automobile tires.

Conservation of the Elasticity of Rubber

A very interesting article is published in the *Zeitschrift fuer angewandte Chemie*, volume 34, page 465. The conservation of the elasticity of rubber is studied by artificial stimulation of colloidal activity through the agency of alkalies and other media, which may be used for the formation of colloidal dispersions. The following conclusions were reached after a careful examination of the results obtained and published in the literature. In the first place alkaline compounds were found to be capable of dispersing colloidal rubber. The volatile alkaline compounds produce a dispersion which only assumes the state of an aggregation, when the alkaline base is removed by slow careful evaporation. The less the volatility of the alkaline compound, the more favorable will its effect be on the colloidal rubber and the more lasting its influence. In the successive transformations from the dispersive into the aggregate state, the elasticity and the initial properties are in general preserved. The elasticity of the rubber can be preserved artificially by artificial stimulation of its dispersive powers through the incorporation of alkaline compounds with the rubber.

Improvement in the Vulcanization of Rubber

The accelerating powers of diarylthio-ureas are known. However, it is claimed that if, in these substances, hydrogen atoms, situated in the ortho position with respect to the nitrogen group, are replaced by alkyl groups, the accelerating power is considerably increased. Thus 50 parts of rubber in sheet form are vulcanized in ten minutes by a mixture, containing 45.5 parts of zinc oxide, 3.5 parts of sulphur and one part of di-ortho-tolylthio urea, if the rubber mixture is heated with steam under a pressure of 2.82 kilograms. Under the same conditions, the use of diphenylthio- urea requires one hour of heating. This accelerator is derived from the action of carbon disulphide or ortho-toluidine, but alkylated groups can be found in other positions and it is also possible to replace ortho-tulidine by xylidines, cumidines, aminocymene, etc. French Patent No. 525,268.

Changes in Vulcanized Rubber

In the *Gummi Zeitung*, volume 35, page 633 there is given an interesting account of some experiments to determine the changes that take place in rubber within the first few days after vulcanization. Vulcanized rubber undergoes a change in physical properties on standing, so that a determined space of time must elapse between its vulcanization and the mechanical testing of the vulcanized product. An investigation was made to determine just how much time must elapse before the testing of the rubber can be carried out. It was found that, as far as the accuracy of the results obtained was concerned, it did not make any difference whether the rubber was tested twenty-four hours or seventy-two hours after vulcanization. Consequently, the twenty-four hour wait was adopted as standard in testing the mechanical properties of vulcanized rubber.

Rubber itself is a negative colloid. It will remain in the colloidal condition for a long time in the presence of basic compounds. The presence of such compounds as aniline not only accelerate the vulcanization of the rubber by increasing the degree of dispersion of the rubber colloid, which is the reason why the sulphur is absorbed more easily, but it also increases the duration of the preservation of the vulcanized rubber while preserving the colloid in its dispersed condition.

Galalith in Rubber Making

Galalith is an artificial product, made with a casein base. It is used in the place of natural ivory. For example, keys of pianos are made from this product. In the course of its manufacture there is a considerable amount of dust and waste accumulated. This galalith dust can be used to considerable advantage in compounding rubber. As the dust is all of one color, it makes an excellent filler. When galalith is subjected to the action of ammonia gas, it is changed into a gelatinous product. The formaldehyde, which it contains and which was used in its manufacture, is converted into hexamethylene tetramine and the casein is changed into the soluble form. The mixture that is obtained in this manner possesses the property of accelerating the vulcanization of rubber, due to the fact the ingredients in the galalith form a certain amount of thio-urea at the temperature of vulcanization. It is claimed that very good results have been obtained with the use of this product for this purpose. For further details the reader is referred to Kunstoffe 1922.

Vulcanization of Rubber in Solution

If rubber, in solution in an organic solvent, is heated with sulphur at about 120 degrees C., the nature of the product depends on the concentration of the solution and solvent used. With dilute solutions (one or two per cent) and with solvents such as nitrobenzene, petroleum essence, phenetol, etc., a gelatinous deposit is obtained which, when dried, is a hard elastic mass with a black fracture. After extraction with acetone it contains 15 to 30 per cent of "combined" sulphur, depending on the conditions. With solvents such as aniline, xylene, thymol etc. no precipitate is obtained even after boiling for several weeks. With 10 per cent solutions, in solvents of the first group the viscosity of the solution at first diminishes on heating, until it reaches a minimum, after which it rises first slowly and then rapidly until the liquid forms a gel. These gels show the phenomenon of syneresis. The sulphur content of the products obtained after extracting these gels with acetone is 20 to 30 per cent. *Comptes Rendues*, 1922, volume 175, pages 102 to 104.

Leather Stains Removable with Rubber Cement

By Ismar Ginsberg, B.S., Ch.E.

AS is well known, leather stains rather easily. Leather articles are in common use and are quite apt to come in contact with various oily and fatty substances. Stained leather articles, handbags spotted with grease or fat, traveling bags, shoes, etc., etc., spoiled by being accidentally smeared with such materials as butter, lard, vaseline, linseed oil, salad oil, lubricating oil, and many other materials of similar nature, present a very unsightly appearance. These stains must be removed in some way or the entire leather must be redyed, otherwise the value of the leather article is much impared. When it is considered that there is ample opportunity for leather to become stained both in the course of its manufacture into leather goods and in daily use, it will be realized that it is quite important to be able to remove those stains easily.

But, stains on leather, produced in this manner, are probably more difficult to remove than from any other product, such as textile fabrics, etc. The reason for this is not found in the stains themselves, for there are many cheap liquids in which these fatty and oily substances are soluble, but in the nature of the leather itself. It is generally not possible to remove the stain from the leather in the regular manner by rubbing it with a cloth soaked in gasoline or other fat solvent. Such a proceedure results in the spreading of the stain over a wider surface, which makes the appearance of the leather worse than it was originally.

The bureau of chemistry of the Department of Agriculture in Washington has developed a method for removing stains from leather, which is so simple and so effective that were it not for the fact that it is vouched for by such an authoritative body, its authenticity would perhaps be seriously doubted. This method consists in smearing over the entire stained surface a thick solution of rubber, made with a solvent which evaporates readily. Just as the film of rubber has become about to dry it is peeled off, the stain coming off with the rubber film. In some instances it is necessary to repeat the operation once or twice to effect complete removal of the stain.

Thick Rubber Cement Does the Trick

What will interest the rubber manufacturers is the fact that ordinary rubber cement, one which is fairly thick, can serve for this purpose. Special cements or stain removers can be made very simply by dissolving Para or Ceylon unvulcanized rubber in carbon disulphide. About one part of the rubber to ten parts of the solvent by weight will give good results. It is important that the cement be very thick and quick drying, and that a pure solvent be used. There is one disadvantage in the use of carbon disulphide, which is common to all preparations made with this material, and that is the inflammability of the liquid. It is quite necessary to have good ventilation in the room where the solvent is used and to exclude all open flames therefrom. To keep the rubber from adhering too tightly to the leather, the latter is wet slightly in the immediate neighborhood of the stained part before the rubber cement is applied. If this is done there is no difficulty experienced in removing the film of rubber from the leather.

A study of this peculiar action of rubber cement in removing stains on leather appears to reveal that the process is in the nature of solution and absorption of the greasy materials in the stain spots. The solvent in the rubber cement is also a solvent of the fatty and greasy maerials enumerated above. In the dissolved form these substances are absorbed by the rubber. In this manner the stain leaves the leather and is removed with the rubber film, just as it is about to come dry. The use of very volatile solvents in the rubber preparation make the drying process and, consequently, the entire stain-removing operation a very rapid one. In this connection it may be suggested that rubber cement may perhaps be used successfully in removing perfume stains from artificial ivory or celluloid toilet accessories.

Production of Sea Island Cotton in Dutch Guiana

Extensive experiments with the growing of sea-island cotton, recently conducted in Dutch Guiana, show that this variety of cotton yields more per acre in that region of South America than in the United States. Advantages which sea-island cotton cultivation in Dutch Guiana has over the sea-island cotton regions of the United States are (1) cheap land, (2) cheap labor, (3) no fertilizer needed because of natural richness of the soil, (4) no boll worms or boll weevils, (5) two harvests can be had each year, (6) cheap water transportation to the harbor. [Additional information may be had from the Textile Division or the district offices of the Bureau of Foreign and Domestic Commerce by referring to file No. 64637.] (Consul Chester W. Davis, Georgetown, British Guiana.)

New Swedish Tax on Rubber Tires

(By Assistant U. S. Trade Commissioner H. Sorensen, Copenhagen)

A new law has recently been enacted in Sweden to be promulgated on Jan. 1, 1923, revising the tax on rubber tires. Rubber tires imported into Sweden will, according to the provisions of the law, be subject to a tax of 1.50 crowns per kilo, to be paid with the duty (1 crown=$0.26). Rubber tires on automobiles imported into the country are likewise subject to this tax, payable with the duty on the automobile. The tax, however, is not applicable in cases where exemption from custom duties has been granted.

It is further provided that manufacturers of rubber tires in Sweden within a month after the close of every quarter must submit to the Government lists of tires sold to users or put into service for the manufacturer's own account.

Siamese Tire Market

(By U. S. Consul J. P. Davis, Bangkok, Siam)

THE number of passenger automobiles in operation in Siam is between 1,500 and 1,600. About 75 per cent of these passenger cars are on metric clincher tires, about 20 per cent on inch clinchers, and 5 per cent on inch straight-side tires.

Straight-side tires are offered for sale in this market by the French-Michelin company, as well as by American companies. American clincher tires are also freely available, and American-made cars are still being brought into this market on metric clincher tires.

The total number of motor trucks in the country does not exceed 150. About 10 per cent of the trucks use pneumatic-tire equipment, the remaining 90 per cent requiring solid tires The most popular tires in this market are American, British, French, and Italian.

Rubber Book Covers

An attractive and interesting portfolio of photographs entitled "The Production of Plantation Rubber" has been published by Guthrie and Co., of 5 Whittington-avenue, London, E C. 3, rubber secretaries and agents. It gives an excellent idea of the different stages of rubber growth and transport from the felling of virgin jungle to the collection, curing, and shipping of the commodity in the form of crêpe or sheet for the use of manufacturers. The volume itself is bound in reconstructed leather, a composition of rubber and leather dust, which contains 35 per cent of pure plantation rubber vulcanized by the Peachey process. This material has an artistic appearance and is quite serviceable. It suggests the more general use of rubber-and-leather and rubber-composition bindings for fine volumes.

Physics of Rubber, 1920 - 1921

A Summary of Developments, with Synopses and Bibliography

By W. B. Wiegand

Managing Director, Ames Holden McCready, Ltd., Montreal, Canada

PERHAPS the most valuable publication of the period is "Plantation Rubber and the Testing of Rubber," by G. S. Whitby; Part II of which includes a review of the work on rubber by some of the master physicists of the nineteenth century. Nothing could be more fruitful than the repetition of much of this work, with due regard to composition and life history of the mixings employed.

Physical Structure

UNSTRAINED—The spatial distribution of discrete ingredients in vulcanized rubber has been admirably studied by H. Green, [1] [2] whose photomicrographs show clearly the phenomena of dispersion and agglomeration. The extension of his work to uncompounded rubber may add to our knowledge of its ultimate colloidal structure and so supply visual confirmation or otherwise of the net work hypothesis of C. O. North, [3] and of the spheroidal theory of R. W. Lunn.[4]

STRAINED—The development of vacuoles at the poles of particles in strained rubber, predicted on theoretical grounds by H. F. Schippel,[4] has been visually confirmed by H. Green.[5] This phenomenon has deep significance in connection with the theory of reinforcement.[6]

Mechanical Properties

The physical testing of rubber has been actively carried on but with no important contributions to testing technic.[7] Standardization as to equipment, procedure, and representation is beginning to receive the attention it deserves.[8]

STRESS-STRAIN CURVE—The attention of rubber workers continues to be directed less toward breaking values and more toward the complete curve. The "conchoid" analogy of Schidrowitz and Goldsborough has been shown to be inadequate;[9] and Shields,[10] and somewhat later, Hatschek,[11] have published new formulas based on curves distorted by calculation to actual cross section; the former, who seems to use only the early part of the curve, arriving at a complex logarithmic expression, the latter deriving in elegant fashion a rectangular hyperbola for the same curve. The present writer finds that when the Hatschek method is applied to curves for stocks representing a range of typical factory mixings the construction is inapplicable. Moreover, neither author has established any physical significance for the parameters that appear in their equations.

Vogt[12] has described a modified method of recording stress-strain data, which facilitates the closer study of reversion phenomena.

ENERGY RELATIONSHIPS—Of the many physical constants used to describe the properties of a sample, perhaps the most comprehensive single index is the energy of resilience as measured by the area subtended by the s.-s. curve on the elongation axis. Proposed in June 1920,[13] this quantity has been widely adopted. Gurney and Tavener[14] describe the energy absorption of various mixings subjected to repeated stresses, emphasizing the superiority of high-rubber compounds for work (such as in airplanes) requiring a slow rate of energy absorption. An important application to automotive equipment is the use of rubber spring shackles.[15] Hysteresis losses, as influenced by cure, pigment loading, and cyclic elongation, are described by Wiegand.[16]

An interesting fact is the very large increase in resilience induced by the addition of a highly dispersed nonelastic phase such as carbon black.

VOLUME CHANGES—The outstanding contribution is H. F. Schippel's[4] paper showing the enormous increases in volume (as much as 100 per cent) when highly pigmented stocks are strained. This has a vital bearing on elastic theory. Sanderson[17] has studied the thermal expansion of various mixings, finding no discontinuity at the vulcanizing point.

GRAIN—Van Rossem[18] has described calender grain, including its disappearance through heating, which he assigns to the Joule effect. In this opinion he is opposed by Wiegand[19] and Lunn[4] who regard the phenomenon as essentially due to viscosity-temperature relationships. (See also Skellon.[20])

Hardness tests have been thoroughly studied by Gurney,[21] particularly as applied to the manufacture of rubber-covered rolls.

EFFECT OF COMPOUNDING INGREDIENTS—The connection between fineness of subdivision and reinforcing action has been definitely established. [2] [6] Further work is necessary to clear up the role played by adhesional forces as distinguished from specific surface. The mechanical properties of vulcanized rubber have been shown to be controllable over very wide ranges through the intelligent use of various fillers. The remarkable reinforcing properties of carbonate of magnesium have been well established by Greider.[22] Mineral rubber has been the subject of a masterly study by C. O. North.[23]

The important bearing of particle shape upon the phenomena of grain, set, and hysteresis demands further study.[24]

MEASUREMENT OF PARTICLE SIZE—The importance of subdivision as a guide to pigment reinforcement has stimulated H. Green[25] to develop to great precision the direct microscopic method. Using violet light, this worker has been able to measure particles down to 0.2 micron in diameter. H. A. Gardner[26] has described a very novel method of estimating the fineness and texture of pigments by rubbing them on a phonograph record. W. W. Vogt[27] favors the obscurometer method of measuring average particle size. This has had strong criticism from the standpoint of refractive index.[28]

Those who favor clay as a compounding ingredient will find the paper by Comber[29] very suggestive.

The race for superfine rubber pigments has led to intensive research, working both from the atomic state (sublimed litharge, zinc oxide, magnesium carbonate), and from the coarse condition.[30]

Thus we may soon come upon the ideal pigment, one which unites colloidal fineness with freedom from entrained air and is at the same time light, cheap, and easily dispersed on the mill. The production of such an ingredient in the standard colors will mark a new era in rubber compounding.

PHYSICAL EFFECTS OF ACCELERATORS—Reinforcement is, however, attainable by means other than the introduction of a highly dispersed phase. The organic accelerators, besides shortening the cure, greatly improve the mechanical properties. Schidrowitz and Burnand[31] have shown that piperidine piperidylithiocarbamate increases energy of resilience and ultimate tensile and decreases (improves) the "slope"—facts well known in the art.

Lack of space precludes detailed reference to other papers bearing on the physical aspects of acceleration.[32] Especial importance, however, attaches to the scholarly work of Twiss and his collaborators in which, *interalia*, is described the interesting pseudo-reversion of accelerated mixings containing only small percentages of zinc oxide.

OTHER PHYSICAL PROPERTIES—The thermal conductivity of rubber and the more common ingredients has rightly attracted attention, and during the period under review two papers have appeared, Somerville,[33] and Williams.[34] The results arrived at by these two workers differ so radically as to leave the reader in complete ignorance. The subject deserves clearing up.

The Journal of Industrial and Engineering Chemistry

* Numbers in text refer to References at end of paper.

Hitherto the reversible heat (Joule effect) involved in deformations has been left entirely unrecognized in physical testing. Isothermal or nearly isothermal conditions have been chosen, whereas service conditions (as in tires) are in many cases adiabatic.

Thus the present writer feels that rubber deserves better from the thermodynamicians, and looks to the day when a Willard Gibbs or a van't Hoff will formulate for rubber the laws so carefully worked out for gases and solutions. In this connection the impact test (by Schob pendulum, for example) offers possibilities for adiabatic research.

The physical conditions attending the action of light on rubber have been carefully studied by Porritt.[35] [36]. An interesting commercial development is the "Rubber Glass,"[37] being developed by Fordyce Jones by means of the Peachey cure. It will be interesting to observe the light aging properties of this substance.

The variability of crude rubber as regards cure is becoming relatively less important than its variability as regards milling properties and behavior in cements. We hope for more papers on this problem. The difficulty has been to develop clear-cut technic for the quantitative expression of these differences.

Permeability to gases has been carefully studied by Edwards and Pickering.[38] Accelerated heat aging tests have become a definite part of testing technic, owing chiefly to the work of Dr. W. C. Geer.[39]

It is to be hoped that an increasing number of graduate physicists will be attracted to rubber, a subject in which they will find ample scope for work of the greatest theoretical as well as practical importance.

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What's This? A Rubber Shortage?

Java Planter Insists There Will Be One in 1926 and Shows Why

G. F. Bodde, of Weltevreden, Java, in an article recently published in the *Nederlandsch-Indisch Rubbertijdschrift*, points out that no estimates of future production take into account the fact that rubber trees yield increasing quantities of latex up to a certain age, generally 12 years, after which the yield gradually declines. Therefore in calculating productions it should be remembered that the increasing crops from the younger trees are balanced by the backward movement in the older plantations, the average maximum yield being 400 lb. per acre.

According to the writer's estimates, by 1926 the future total world's crops under normal conditions and without restrictions would be 413,500 tons, which includes 20,000 tons of wild rubber. Calculating that the consumption for 1921 was 300,000 tons, and that thereafter it would increase annually by 25,000 tons, the total for 1926 comes to 425,000 tons, which shows a shortage of 11,500 tons in that year of production as against consumption.

This being the case, the actual condition is summed up as follows: The present planted acreage is not too great for the more distant future need of rubber, but expansion took place so rapidly that the regular increase in consumption could not keep up with production, whereby a surplus has accumulated which it will take five years to absorb.

Restrictive Measures Would Create Shortage in Two Years

Temporary restriction is not a measure to prop up weak producers, but rather a means of regulating the temporarily disturbed balance between demand and supply, to the benefit of producers now and of consumers later on. If the agreement to restrict by 25 per cent, to which many producers have adhered, could be carried out for two years or more, by the end of 1923 there would be a shortage of 11,625 tons of crude rubber.

Mr. Bodde's statements have been freely criticised, the three main objections being:—

(1) The figures for production are placed too low.

(2) No account has been taken of the fact that technical research in the plantation of rubber is progressing and that much is being done to increase yields.

(3) The world consumption of rubber for the next few years has been placed too high.

Answering these objections, Mr. Bodde states that his calculations are based on accepted figures. As for technical improvements, soil cultivation, manuring, thinning, and fighting of diseases, etc., these are precautions against estate deterioration, and subsequent decreased yields. As for selections, any benefits derived therefrom relate only to future plantations and not to those already in existence. As for greatly increased yields by vegetative reproduction, Mr. Bodde believes that an average of 500 lb. per acre of budded trees tapped over one-quarter on alternate days is more than satisfactory.

Regarding consumption figures, these are justified by statistics which show that while the use of rubber is expanding in America, it is increasing at a proportionate rate in other countries.

British Tire Imports

During the first three months of 1922 the number of automobile casings imported into the United Kingdom, according to official statistics, was 268,067, as compared with 144,122 during the corresponding period in 1921. France supplied 116,332 casings; the United States, 75,762; Italy, 50,171; Canada, 20,821; and Germany, 2,751.

NEWS OF THE INDUSTRY

News of the Rubber Association

THE board of directors of the Rubber Association held its postponed September regular meeting on Oct. 4 at the Lotos Club, New York City. The specification committee of the Mechanical Rubber Goods Manufacturers' Division met with a sub-committee of the committee on specifications and tests for materials of the A.R.A. on Oct. 17, the following named specifications being considered:

Proposed A.R.A. general instructions on standard methods of tests of mechanical rubber goods; proposed standard A.R.A. specifications for cold water hose; wrapped canvas and braided air hose; tender tank hose; fire hose; steam hose; friction surface axle light belting and packing.

The October regular meeting of the specification committee was held on Oct. 18, at which consideration was given to a number of governmental and individual railroad specifications. Attention was directed to the fact that certain specifications of individual purchasers for elevator belts and other mechanical rubber goods provide for a strength requirement of 350 pounds per inch per ply on 32 ounces duck, which the committee believes is considerably in excess of that obtainable on any 2 ounce duck in commercial use. The committee expressed the opinion that 260 pounds should be the standard maximum strength requirement for 32 ounce duck.

The executive committee of the Mechanical Rubber Goods Manufacturers' Division also held a meeting on Oct. 18 at the Yale Club, New York City. A subcommittee was appointed to consider time and tonnage guarantees on conveyor belts and to report its recommendations at the next meeting. A report of the activities of the specification committee of the division was rendered to the executive committee and the latter body strongly endorsed the work.

The executive committee of the Tire Manufacturers' Division met at the Yale Club on Oct. 18 and a number of important subjects were considered.

Educational Posters Distributed

The association office is proceeding with the distribution to tire dealers throughout the country of an educational poster or placard suggesting the avoidance of the common tire abuses and presenting illustrations of the way in which damage to tires usually occurs.

The standard claim form which is used in connection with the Manufacturers' Standard Tire Warranty was considered at a meeting of the service managers' committee of the Tire Division at its meeting on Oct. 9, and several changes which simplify the form but do not detract from its effectiveness were recommended. These reommendations were approved by the tire executive committee on Oct. 18 and the association office is proceeding in the distribution of electrotype plates to manufacturers for their use in printing the revised standard claim form.

European Publicity for Straight Side Tires

The English, French, Danish and Dutch editions of the association's educational pamphlet entitled "Why Straight Side Tyres Are Better" have been distributed to automobile and tire dealers throughout the world and the association is about to begin the distribution of the Swedish edition. As the name of the booklet indicates, it presents arguments in favor of the straight side as against the beaded edge tire. The reports received from abroad indicate that the pamphlet is receiving hearty approval and should be of considerable assistance in promoting the use of American made straight side tires in foregn markets.

Following the close of the summer season, all of the divisions and committees of the association have resumed their activities and the association staff is kept busy handling meetings and other functions relating to the work of the different groups.

Co-Operation with R.G.A. Committee Asked

The following cablegram was dispatched on Oct. 27 to the Rubber Growers Association of London on behalf of the Rubber Association of America:

"At a meeting of the Board of Directors of the Rubber Association of America held on Oct. 26, a special committee was appointed to study the effects upon the industry of pending crude rubber restrictions and made recommendations for safeguarding consumers' interests.

"The Rubber Association of America recognizes the desirability of stable rubber prices and the necessity for plantations to earn a return upon the investment which will assure the future of the plantation industry.

"It is thought the proposed restriction carries with it great danger to the entire industry, planters and manufacturers alike, and that closer contact between the growers and consumers will be beneficial to the industry as a whole.

"As a preliminary step to a broader understanding, the special committee on behalf of the Rubber Association of America extends a cordial invitation to the Rubber Growers Association to send a committee here to discuss plans which will protect mutual interests of consumers and producers.

H. STUART HOTCHKISS,
Chairman Special Committee."

General's Prosperity

The annual sales conference of the General Tire & Rubber Co. took place at the Akron factory during the week of Oct. 23. Coincident with Vice President O'Neil's opening address stating that the company had completed the most successful year in its history came the announcement that work would start at once on three three-story additions to the plant to be rushed to completion in sixty days. The additional units will be 60 by 100, 40 by 180, and 36 by 100, each three stories high. Two additional mill lines, more heaters, molds and cores, and a corresponding number of tire building machines will be installed.

The company's annual statement at the end of the fiscal year is expected to create something of a sensation in rubber manufacturing circles, because of its steady growth and financial position, according to the company's announcement. No new stock is to be sold in connection with the expansion; the cost will be taken care of out of the business itself. The regular quarterly dividend on common stock has been authorized for payment Nov. 1. General has never missed the payment of a dividend.

The principal speakers at the sales sessions were, in addition to Vice President O'Neil, S. S. Poor, of the New York City branch; W. G. McCruden, Chicago; T. L. Moore, Dallas, Texas; C. H. Boyer, San Francisco. Several hundred managers, salesmen, officials and department heads attended the "conference dinner" at Young's Hotel in Akron on Oct. 23.

Seiberling Making Truck Tires

The Seiberling Rubber Co., Akron, Ohio, has started the manufacture of pneumatic truck tires of extra heavy tread rubber, of 4200 pounds per square inch tensile strength. A new construction feature is the extension of the tread from bead to bead which, the company announcement says, affords "unprecedented protection against curb and rut abrasion." Other advantages are claimed for this "All-Tread" truck casing.

Mid-West October Meeting

The regular monthly meeting of the Mid-West Rubber Manufacturers' Association was held at the Hotel Morrison, Chicago, on October 10 with a good attendance. W. W. Wuchter of Omaha, Neb., president of the association, presided.

Despite the flourishing situation of the automobile industry, the condition of small tire manufacturers in the middle west is deplorable as a result of keen competition and the price cutting war which has been in existence during the past year. This was the general sentiment expressed by those present. The number of small tire firms going out of business and others on the verge of bankruptcy as a result of price cutting is explained by the offering of one firm of 30 x 3½ inch cord tires at $5.50. It was, however, predicted that good times are ahead for the tire trade generally and that the coming of spring will see a much improved condition.

In commenting on some statements made that there is a year's supply of tires in this country, the following August figures were cited showing not more than 45 days' supply of tires on hand: Figures of 63 firms, excluding one of the largest, for August showed 4,629,000 tires in first hands; 2,905,000 tires produced; domestic consumption, 3,029,000; and exported, 85,264. The figures on tubes in August showed an inventory of 5,207,000; production of 3,808,000; domestic consumption, 4,220,000; and export, 90,000. About 11,000,000 pounds of fabric were used during the month, of which 4,798,000 pounds were square woven and 6,200,000 pounds cord.

It was voted to hold the next regular monthly meeting in St. Louis, Mo. S. J. Roy of Hannibal, Mo., urged the associate members to co-operate in making this meeting a success.

Dr. R. P. Shepherd of the Illinois Relations Committee, of the Chicago Association of Commerce, the principal speaker, delivered an impressive address urging tire manufacturers to develop group thinking and acting and friendly relations among the people in their own communities, all of which make for greater manufacturing and distributing efficiency.

Corrugated Rubber Plans

The Corrugated Rubber Corp., of which Walter L. Fairchild is vice president, has invested $70,000 of its own money for land, machinery, and buildings and the Poughkeepsie Trust Co. and Chamber of Commerce industrial committee jointly have advanced $90,000 toward the erection of buildings, according to reports in the Poughkeepsie, N. Y., newspapers. Corrugated inner tubes and other rubber goods will be manufactured in the new plant the first unit of which is to be 100 by 200 feet, located on a thirteen acre tract recently purchased by the company.

Auto Industry Now Largest

The automobile industry is now the largest in the United States, and Miller Rubber Co. officials predict sales for 1922 will reach $2,750,000,000. More than 1,800,000 motor cars will have been made and sold by the end of this year. Tire sales will amount to $700,000,000 according to Miller.

Ajax Plant Contract Extended

At a meeting of the Sandusky, Ohio, Chamber of Commerce on Oct. 18 the final tabulation of the referendum vote of subscribers to the site fund, on the question of extending until June 22, 1923, the time for the erection of the local Ajax Rubber Co. plant, was made. It was announced that 53 per cent of the subscriptions, representing about $67,000, had been voted in favor of the contract extension. Thirty-five per cent, or about $17,000, did not vote.

This extension, suggested by the Ajax company, probably means that the Sandusky plant will be under construction on or before the date mentioned.

Mandrel Factory for Akron

According to the industrial bureau of the Akron Chamber of Commerce, the New Haven Sheridizing Co., of Hartford, Conn., is seeking 7,000 square feet of factory floor space in Akron for the manufacture of mandrels and iron frames used in the making of inner tubes for tires. A. F. Shoen, manager of the company, states that transportation costs can be saved by moving the factory near the market. Carloads of mandrels are brought into Akron for the rubber factories and freight charges amount to a large sum yearly. The Hartford concern has not decided whether the Akron plant will be the main factory or only a branch.

Stanwood Has New Processes

The Stanwood Rubber Co. which has a $1,000,000 plant on the city line between Newark and Elizabeth, N. J., is reported to have acquired new patents and processes which are said to reduce the cost of manufacturing rubber goods. These processes cover a wide field of usefulness where rubber compounds are concerned. The company plans to apply these new chemical methods in the manufacture of specialties for the automobile business, electrical insulation, radio and the like. Tires are already being made at the plant.

To Make Toy Balloons

Supreme Rubber Products Co., which recently purchased the plant of the Rayen Rubber Co. at Ravenna, Ohio, will manufacture toy balloons and other rubber novelties there. W. H. Kerr of Cleveland is president and W. T. Brown of Akron, formerly with Miller for seventeen years, is vice president of the company.

Seiberling Wins Patent Suit

F. A. Seiberling, founder and former president of the Goodyear Tire & Rubber Co. of Akron, now president of the Seiberling Rubber Co., operating plants at Barberton, O., and New Castle, Pa., and the inventor of the first tire building machinery to be used in this country, won a notable victory on Oct. 21 in the United States district court of appeals, third circuit, at Philadelphia, in his patent infringement suit against the John A. Thropp & Sons Co. of Trenton, N. J., the court of appeals reversing the trial court's decision and handing down a decision in Seiberling's favor.

It is expected that the case will be carried at once to the United States Supreme Court.

The final outcome of the Seiberling suit closely concerns the tire industry as the John A. Thropp & Sons Co. is one of the largest manufacturers of tire building machinery and is supplying such equipment for more than sixty tire factories in the United States.

The Seiberling suit charges infringement of two of Seiberling's tire building machinery patents, which he invented and used at the Goodyear plant in Akron, the litigation specifically involving spinning rolls and high speed cores used on machines spinning the cotton fabric into the tire carcass.

Prior to the final argument of the case before the trial court, the United States district court of New Jersey, last February, Seiberling withdrew his infringement claim on his first patent and filed a disclaimer which sought to read into the latter patent a particular process of tire building. The district court in its decision ruled that the patent infringement claim as modified by the disclaimer was invalid, on the ground that the process or method specified was nothing more than had formerly been followed by hand in tire construction.

The court of appeals, however, in its decision reverses the trial court and validates Seiberling's claim of a patent infringement.

The outcome of this case has also an important bearing on a similar suit filed some time ago by Seiberling against the Firestone Tire & Rubber Co. of Akron and in which case the Firestone company received the verdict in the United States district court of appeals at Cincinnati a year and a half ago. This case is pending on appeal.

Goodyear "Gridiron" Dinner

"All Goodyear Night" featured the second annual "gridiron" dinner of the Goodyear organization on Nov. 4 at general office dining hall, Akron, when 200 company executives, department heads, and sales managers were the guests of President E. G. Wilmer. Hugh Allen had charge of the affair which was a huge success. Mr. Wilmer and other factory executives addressed the men after the dinner and entertainment.

Manufacturers' Profits on Crude Rubber Inventories

United States Rubber Co. probably is in more favorable raw material inventory position than any of its competitors, but actual benefits from the recent rise of nearly ten cents a pound in crude rubber are being unduly magnified, officials say.

It has been estimated that at current prices around 23 cents a pound this company has a paper profit of more than $5,000,000 on its crude rubber holdings. This is characterized as "entirely too high" by officials who point out that even if this were correct it could not be reflected unless the rubber were actually sold at the higher prices. No benefit will accrue unless prices of finished rubber goods are advanced and then it will spread over the period necessary to work off the rubber.

Belief prevails in some quarters that as the price of crude rubber advances rubber companies mark up their inventories of the commodity purchased at lower levels. U. S. Rubber will take no such step and it is unlikely that other manufacturers will do so.

At no time in the past two years has the company made any effort to purchase large quantities of raw material at a time. It has been its recent policy to commit itself on as short a position as is consistent with maintenance of adequate stocks. The management knew that none of its competitors were buying heavily at low prices and was content to stay in line with them.

With respect to crude rubber, however, U. S. Rubber has a decided advantage over most of its competitors as the price rises, because it operates its own rubber plantations comprising about 80,000 acres in Sumatra. They are among the lowest cost producers of rubber and since they supply the company with a substantial part of its requirements the saving is considerable.

Michelin Cuts Tire Prices

Slashing of tire prices, which has been the rule in the United States until recently, has spread to Europe and both Michelin and Dunlop have cut consumer quotations twenty per cent or more. Michelin's reductions apply in the Scandinavian countries, France and Belgium. The Michelin tire business in Denmark is eighteen to twenty per cent of the total, in Norway three to five per cent, and in Sweden probably less. This company still dominates the tire market of France and Belgium.

Granville, Wis. Tire Factory

The Rauschenberger Tire Co. of Akron plans to erect a factory at Granville, Wis., the building to be 175 by 320 feet and equipped with the newest tire-making machinery.

India's New Truck Tire

Dealers are reporting favorable comment and increasing demand for the new double-oversize, extra-ply, flat tread India cord truck tire. The tread of this new tire was especially designed for conformity to road surfaces. The broad, flat face which comes in contact with the road, wears very slowly and evenly, and gives greater traction and non-skid qualities. The heavy ribs on both sides of the tread afford additional protection against rut and curbstone wear.

The tread stock has been brought well down over the sidewalls, giving added strength to the carcass. The bead has been extra-heavily reenforced. A special cushion and breaker strip construction is incorporated which distributes road shocks to all parts of the tire, rather than allowing the shocks to be absorbed by just those portions which are struck.

India officials state that sales of this tire are far surpassing production, even though all of the equipment for making these sizes is in constant use.

$2,500,000 Muskogee Plant

The organization of the Oklahoma Fabric & Rubber Co., with a capital of $2,500,000, to manufacture cotton fabric for tires and rubber goods, was recently announced. Capitalists of Allentown, Pa., are said to be back of the new enterprise. The three-story Y. M. C. A. building in Muskogee, Okla., has been purchased for use as a factory.

Marion Plant Doubles Output

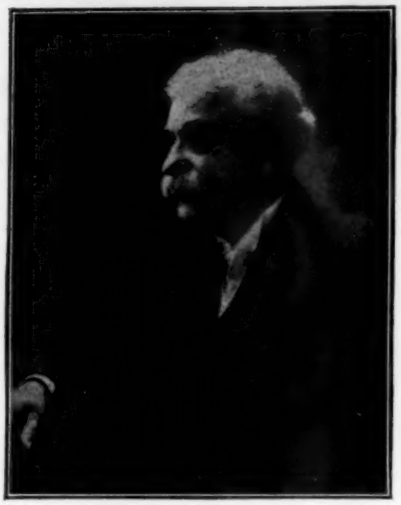
The Studebaker-Wulff Rubber Co., Marion, Ohio, has decided to double the output of its factory and in December will install new machinery to cost between $35,000 and $50,000. The plant is operating on day and night shifts.

Death of John S. Lucock

John S. Lucock, superintendent of the Detroit Insulated Wire Co., Detroit, Mich., died on Oct. 10 in his fifty-seventh year. A native of England, he came to this country at the age of eighteen and for many years was employed by the Western Union Telegraph Co. In 1903 he became superintendent of the National Cable & Wire Co. in Pittsburgh. Three years later he assumed the position which he held until his death.

J. H. Hunter, president of the Detroit company, pays this tribute to its late superintendent:

"He was an exceptional man in many ways. His mechanical ability bordered on genius; his electrical knowledge was broad and comprehensive; he excelled in mathematics; he was a literateur; but above and beyond all he was a man. His kindly and helpful disposition endeared him to all who knew him. He was slow to anger and of great patience. His home life was the ideal of a true Christian gentleman. This company records its deep and permanent loss."



CHARLES J. TAGLIABUE

Charles J. Tagliabue Dies

Charles J. Tagliabue, president of the Charles J. Tagliabue Mfg. Co., one of the oldest concerns in the United States engaged in the manufacture of temperature and recording instruments which are used largely in the rubber industry, died suddenly on the night of Nov. 2 at the home of his sister, Mrs. Jospehine T. Hawxhurst, 1193 Bergen street, Brooklyn, N. Y.

Mr. Tagliabue was widely known in the business world and had resided in Brooklyn for nearly 45 years. He was 70 years old.

He was born in Manhattan, son of the late Giuseppe and Adelaide Tagliabue, and was formerly in business for some years at Pacific street and Howard avenue. His summer residence was at Shoreham, L. I. He was a thirty-second degree Mason, being a member of Bedford Lodge, F. & A. M., and also belonged to the Scottish Rite bodies of Brooklyn, to Kismet Temple Nobles of the Mystic Shrine and the Brooklyn Masonic Veterans Association. He was a member of the Brooklyn Chamber of Commerce, the Manufacturers Association of Brooklyn, the Rotary Club, and the Kings County Republican Club.

Surviving are his wife, Josephine C. Hyatt Tagliabue; a daughter, Mrs. Herbert J. Hapgood, and his sister. The funeral services were held at St. Mark's P. E. Church Nov. 5. Interment was at Woodlawn Cemetery.

New Sulphur Plant in Akron

The National Sulphur Works is one of the new industries which is locating in Akron, Ohio. The company has practically completed the erection of a $750,000 plant at Bettes Corners and will soon start production with the employment of several hundred men.

Arthur E. Beggs, secretary of the company in a letter to City Manager Tucker, praised Akron for speedy work in paving East Talmadge avenue to the new sulphur plant.

Strike at Mason Plant?

Workmen at Mason Tire and Rubber Co., Kent, Ohio, reported Oct. 30 that 500 tire builders had walked out because of a 15-cent an hour reduction in wages. They said the plant employing 1000 men was completely closed.

"There is no general strike", P. D. Graham, factory manager, said. "There was a small reduction in wages of finishers but this was merely an adjustment to balance wages throughout the factory. Approximately 25 men who were dissatisfied with the reduction have quit. We are getting along just as well without them and have no fear of a general strike."

Madison Borrows $750,000

Stockholders of the Madison Tire & Rubber Co., Buffalo, N. Y., have authorized the company officials to borrow $750,000, payment of the loan to be secured by serial bond and mortgage on real estate, equipment, and machinery owned by the company in Buffalo.

Burlock Moves Offices

The Burlock Non-Skid Tire Corp. has moved its executive offices from 828 Seventh avenue, New York City, to Suite 608 Fiske Building, Broadway and 57th street. The company manufactures a cord tire with a series of burrs of coiled steel wires built into the tread, the ends of these wires gripping the road. It is claimed that under the most dangerous skidding conditions these "burr-lockt" treads cannot slip but hold the casing tight against the pavement.

McKone on 6 Per Cent Basis

A semi-annual cash dividend of three per cent, covering operations for the past six months, was declared payable to holders of common stock by the McKone Tire & Rubber Co., of Chicago at the directors' meeting in Cleveland on Sept. 25. This places the common stock of the company on a six per cent basis.

Inland's New Officers

The following officers and directors were elected on Oct. 16 at the annual meeting of stockholders of the Inland Rubber Co. of Chicago; E. B. McKay, president and general manager; M. J. Flynn, treasurer; F. L. Ayer, secretary. Directors: The officers and Adolf Kuecken and A. Colnon.

Shenango Plant Closes

C. E. Kinney, acting president, and C. A. Raach, secretary-treasurer, of the Shenango Tire & Rubber Co., Greenville, Pa. have closed the plant and left for their homes in Ohio. The company was formed about three years ago and $104,000 in stock sold in Western Pennsylvania and Eastern Ohio. Only the basement of the factory was completed and a small number of tires were produced. Lack of working capital caused the officers to abandon the enterprise.

Rubber Co. President Suicide

The body of Winfield Clearwater, former president of the Smith Rubber & Tire Co., Garfield, N. J., was found in the Wallkill river at Tillson, N. Y., on Oct. 19. His arrest had been sought on the charge of misappropriating a $3,500 account in the Secaucus National Bank of which he was president. The bank examiner said the total defalcation would amount to about $7,000.

The rubber company has closed pending bankruptcy proceedings. Several hundred stockholders, representing more than 3,000 investors in the stock, have formed an association to retrieve as much of the loss as possible. Mrs. Clearwater, the widow, has offered to turn over her home in Rutherford, N. J., worth $16,000, to meet the bank shortage.

Fillmore A. Drake Dies

Fillmore A. Drake, long a prominent figure in the rubber industry, died on Oct. 14 at his home, 81 Harrison street, East Orange, N. J. He was associated with the B. F. Goodrich Co., the G. & J. Tire Co., president of the Berrodin Rubber Co. of Philadelphia, and more recently sales manager of the Howe Rubber Co. A widow, two children, mother, sister and brother survive him.

Receiver for Ashland

George Hildebrand has been appointed receiver of the Ashland Rubber Co., Ashland, Ohio, under a bond of $100,000, following an application by the directors to the court. An advisory committee of stockholders will act in conjunction with the receiver in the management and disposal of the business. The receiver is authorized to continue operation of the plant as the business warrants.

Personals

R. C. Fulmer has assumed the presidency of the Amazon Rubber Co., Akron, Ohio, succeeding L. J. Schott who resigned a few weeks ago.

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Frank W. Hodges, of Melrose, Mass., president of the Pine Tree State Rubber Heel Co., a new concern with factory at Sabatis, Maine, has purchased a home in Auburn, Maine.

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Ray Justice, formerly with the McKone Tire & Rubber Co., has become superintendent of the Thomas Rubber Co., Millersburg, Ohio.

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W. T. Baker, formerly with the Bethlehem Spark Plug Co., is now Detroit manufacturer's representative for Firestone Steel Products Co.

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S. M. Jett, member of the Goodrich legal department, returned to Akron recently after an extended business trip to Europe.

Personals

F. E. Titus, formerly sales manager of the International B. F. Goodrich Co., has been promoted to be second vice president of Goodrich, in charge of the sales department.

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Harvey S. Firestone has been elected president of the Ohio Council of Churches, succeeding Dr. W. O. Thompson, head of the organization since its founding three years ago.

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G. H. Hilbish, former branch manager for Goodyear at Toledo for nine years and with Goodrich for seven years, has been appointed special factory representative for the Star Rubber Co. of Akron. He is a native of "The Rubber City." Mr. Hilbish says there is a future for the smaller tire manufacturer whose overhead expenses are light.

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George H. Jones has been chosen as secretary of the Knox Tire & Rubber Co., Mount Vernon, Ohio, to succeed F. D. Spencer, resigned. The plant is to start operations shortly.

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E. M. Murray has retired as general manager of the American Tire Corp., Niles, Ohio, and has been succeeded by A. R. Totten, his former assistant.

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W. Martin, representing the North British Rubbber Co. of Edinburgh, Scotland, was a recent visitor at the Goodyear plant at Akron, interviewing Vice president Litchfield and other officials.

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O. W. Thompson, head of the adjusting and payroll departments of Star Rubber Co., has gone to Dallas, Tex., to establish and manage a new company branch in that city.

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Bertholf M. Pettit, who has been doing special sales promotion work at Goodyear, has been appointed manager of the Milwaukee branch. He was formerly advertising manager of the J. R. Case Co. and secretary of the Wallace Tractor Co., both of Racine, Wis.

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Gustave J. Paul, senior partner of G. J. Paul & Co., of Caracas, Maracaibo, and other cities of Venezuela, South America, has returned to his home following a business conference with officials of the Miller Rubber Co. at Akron. The firm distributes Miller products in Venezuela, also represents Studebaker, General Motors, International Harvester, and other large American manufacturers.

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A. E. Osterloh, vice president and general manager of California Goodyear, has been awarded his twenty-year service pin by the Akron factory. He started as a salesman at the Chicago branch and worked his way up step by step. In 1913 he was appointed assistant secretary of Goodyear with his office in Akron.

MARKETS

Cottons and Fabrics

NEW YORK, Nov. 3, 1922

COTTON advanced to a high record for the season since our last review and as prices reached toward the 25 cent level one effect was to make the fabric market buoyant with advancing prices and with heavier buying than at any time during the year.

Among leading cotton men there is much concern over the prospect of an inadequate supply of American cotton to meet the world's requirements. The demands from the cotton industry throughout the world at the present rate of consumption would require production in the United States of at least 13,000,000 bales next year, which would be 3,000,000 bales more than the present crop and 5,000,000 bales more than was raised last year. That the present crop will not be much more than 10,000,000 bales is indicated by the latest ginning report showing 6,962,034 bales ginned up to October 18 compared with 5,497,364 bales last year.

With a yield of only 10,000,000 bales this year there will be very little excess to help carry the world over another short crop.

The Bureau of Census report made public November 2 shows that the available supply of cotton for world use will be only 26,286,000 bales while the consumption for the year ending July 31, 1923 is estimated at 20,047,000 bales; leaving a carry over of only 6,239,000 bales as compared with a 9,536,000 bale surplus from the past season. Stocks on hand August 1, 1921 totaled, 14,752,000 bales and on August 1, 1922, they were, 9,446,000 bales. The bureau estimates that stocks will be only 6,239,000 bales on August 1, 1923. Thus the carry over of cotton is steadily decreasing.

Consumption of cotton this season will be approximately the same as that of the past season with some countries showing an increase and others a decrease. Consumption will exceed production this season by 3,297,000 bales.

Considering the United States alone it is figured that the consumption will be 12,293,000 bales while the estimated production will be 10,000,000 bales. Stocks on hand in the United States on August 1 last are placed at 5,123,000 bales.

Cotton exports in September have been reported and show a total of 368,897 bales compared with 521,831 bales during the same month last year. For the nine months ended with September the exports amounted to 3,849,366 bales as against 4,311,075 bales in the corresponding period of 1921. England took 148,874 bales, against 52,618 bales in 1921; France, 40,063, against 105,621; Germany, 62,873, against 159,241; Italy, 34,162, against 22,696, Japan, 19,477, against 63,899.

Quotations as of November 2 on the New York Cotton Exchange follow:

	Open.	High.	Low.	Close.	Previous Day.
Dec.	24.40	24.60	24.30	24.51@24.58	24.35
Jan.	24.06	24.30	24.30	24.20@24.22	24.04
March	24.15	24.39	24.07	24.28@24.33	24.09
May	24.07	24.23	23.93	24.10@24.15	23.98
July	23.78	23.95	23.71	23.80	23.73

The local market for spot cotton on November 3 reached 25.60 cents for middling upland, the highest level for the current year.

EXTRA STAPLE COTTON

Prices on nearly all types of extra staple cotton advanced during the two weeks period and quotations were up from 1 cent to 2 cents a pound. The insistent demand practically exhausted the available supply of several types. Full 1⅛ inch cotton, strict middling, was in demand at 31 cents and full 1 3/16 could be had at 32½ cents but was generally quoted at 33 cents or higher. Full 1¼ inch brought from 34½ cents to 35½ cents and 1 5/16 from 36 cents to 38 cents.

Egyptians scored a big advance during the fortnight following an excited market in Alexandria. The market quieted down at the turn of the month with prices a shade off. Buying of Egyptian Sak during the last week reached larger volume than for many weeks. Medium grade uppers are now quoted at 29 to 29½ cents and medium sakels from 32¾ to 36⅛ cents. Medium grade Mitififfi is quoted at 27 cents to 28 cents with high grade at 29 cents. Average strict middling Tangris was up to 31½ cents to 32½ cents.

CORD FABRICS

Combed Sakellarides		.78	@	.80
Carded Sakellarides	lb.	.71	@	.73
Combed Peeler	lb.	.66	@	.68
Carded Peeler	lb.	.60	@	—
Combed Egyptian uppers	lb.	.72	@	.75
Carded Egyptian uppers	lb.	.65	@	.70

SQUARE WOVEN

17¼-ounce Egyptian uppers, combed	lb.	.69	@	.72
17¼-ounce Egyptian uppers, carded	lb.	.62	@	.67
17¼-ounce Sakellarides, combed	lb.	.74	@	.76
17¼-ounce Sakellarides, carded	lb.	.67	@	.69
17¼-ounce Peeler, combed	lb.	.63	@	.65
17¼-ounce Peeler, carded	lb.	.56	@	—

SHEETINGS—The market has been very firm with prices advanced about 1 cent on most items. There was good demand for 40-inch, 3.60-yard, which was quoted at 13 cents. 40-inch, 3.75-yard, brought 11¼ cents and 2.85-yard 14¼ cents.

DUCKS—There was the same firm tone in this market as in all the fabric markets as the immediate result of the sensational rise in cotton to close to the 26 cent level. During the period single filling advanced to 19 to 20½ cents and double filling was quoted at 21½ at 22½ cents. Belting could be had at 40 cents and enameling was considerably higher at 44 cents.

BURLAP—Prices were somewhat lower after the two weeks period and at the close trading was light with a market tendency toward firmness. The situation at Calcutta is disconcerting and there will be a much better feeling in the American market when the uncertainty of conditions abroad are removed. Light spots hold well at 6.25 with some sellers asking 6.30.

SHEETINGS

40-inch 2.50-yard	yd.	.16	@	—
40-inch 2.85-yard	yd.	.14¼	@	.14½
40-inch 3.15-yard	yd.	.14¾	@	—
40-inch 3.60-yard	yd.	.13	@	—
40-inch 3.75-yard	yd.	.11¼	@	—
40-inch 4.25-yard	yd.	.10¼	@	—

DUCKS

Belting	lb.	.40	@	.42
Hose	lb.	.40	@	.42
Enameling	lb.	.44	@	.46
Shoe Ducks	lb.	.52	@	—
Single filling	lb.	.19	@	.20½
Double filling	lb.	.21½	@	.22½

BURLAPS (Carload Lots)

8 -ounce 40-inch	100 yds.	6.25	@	6.30
7½-ounce 40-inch		6.20	@	6.25
10 -ounce 40inch		7.50	@	7.65
10½-ounce 40-inch		7.70	@	7.85

DRILLS

37-inch 3.25-yard	yd.	.13½	@	—
37-inch 2.75-yard	yd.	.15	@	.15¼
37-inch 3.00-yard	yd.	.14¼	@	—
37-inch 3.50-yard	yd.	.13	½	—
37-inch 3.95-yard	yd.	.12	@	—

OSNABURGS

30-inch 7-ounce		.16¼	@	.16½
40-inch 7-ounce		.16½	@	.17

Chemicals and Compounding Ingredients

THE INDUSTRIAL CHEMICAL MARKET—NEW YORK, NOVEMBER 3, 1922—The maintenance of price levels during the two weeks period imparted much confidence in the market and resulted in considerable buying for the future. There is a prevailing upward tendency in prices which was noticeable during the entire period and where reactions took place they were only fractional and without special significance. The whole industrial chemical market is showing a stable, steady character which is the kind of a market that both buyers and sellers desire. Some items continue in light supply but this situation is not as acute as it was some months ago. The steady inquiry for most important items would indicate a continuance of a fairly active market.

ACCELERATORS

Organic

Aldehyde ammonia, crystals	lb.	$ .93 @	.95
Aniline oil, bulk basis,	lb.	.16 @	.17
Excellerex,	lb.	.40 @	.45
Formaldehyde-Aniline	lb.	.52½ @	—
Hexamethylene-tetramine	lb.	.95 @	.97½
Paraphenylenediamine	lb.	1.55 @	1.57
Thiocarbanilide, kegs	lb.	.28 @	.30
Vulcocene	lb.	.35 @	—

Inorganic

Lead, dry red bbls.	lb.	.09 @	.09¼
Lead, white, basic carbonate	lb.	.07¼ @	.08
Litharge, domestic	lb.	.09¼ @	—
imported	lb.	.17 @	—
Lime, Superfine	lb.	.02 @	.02½
Magnesia, calcined,			
light,	lb.	.22 @	.24
extra light	lb.	.45 @	—
heavy	lb.	.05 @	.05½
Orange Mineral	lb.	.12½ @	.14

COLORS

Blacks

Carbon Black	lb.	.16 @	.20
Micronex	lb.	.17 @	**24**
Lamp Black	lb.	.12 @	.40
Bone "	lb.	.05½ @	.07½
Drop "	lb.	.07½ @	.16
Ivory "	lb.	.15 @	.45

Blues

Prussian	lb.	.55 @	.60
Ultramarine	lb.	.10 @	.35
Cobalt	lb.	.21 @	.26

Browns

Iron oxide	lb.	.05 @	.06
Sienna, Italian,	lb.	.04¾ @	.05¾
Umber, Turkey,	lb.	.05 @	.06
Vandyke, domestic		.06 @	.07

Greens

Chrome, light	lb.	.30 @	.32
medium	lb.	.35 @	**.36**
dark	lb.	.36 @	**.45**
commercial	lb.	.12 @	—

Reds

Antimony, crimson	lb.	.35 @	.42
golden	lb.	.18 @	.27
red sulphuret	lb.	.20 @	**.22**
Indian, English, pure	lb.	.12 @	.15
Para toner	cwt.	1.00 @	1.10
Toluidine toner	lb.	2.25 @	2.50
Venetian red	lb.	.03½ @	.06
Vermillion, quicksilver,			
English	lb.	1.35 @	1.45
domestic	lb.	.25 @	.30

Whites

Albalith	lb.	.06 @	.06½
Aluminum bronze	lb.	.55 @	.60
Azolith	lb.	.06 @	.06½
Lithopone, domestic (factory)	lb.	.06¼ @	—
Zinc oxide,			
American Horse Head Special	lb.	.07½ @	.08
XX red	lb.	.07 @	**.07½**
American Azo:			
ZZZ (lead free)	lb.	.07 @	.07½
ZZ (under 5 per cent leaded)	lb.	.06¼ @	.06¾
Z (8-10 per cent leaded)		.06 @	.06¼
Zinc oxide, French process, White seal	lb.	.11 @	.11¼
Green seal	lb.	.09¾ @	.10⅛
Red seal	lb.	.08¾ @	.09¼

Yellows

Chrome, light	lb.	.17 @	—
dark	lb.	.17 @	—
medium	lb.	.17 @	—
Ocher, French	lb.	.03½ @	.03¾
domestic	lb.	.03 @	.03¼

COMPOUNDING INGREDIENTS

Aluminum flake	ton	25.00 @	30.00
hydrate	lb.	.17 @	.18
Ammonia carbonate,	lb.	.09½ @	.10¼
Barium carbonate	ton	75.00 @	80.00
Barium Dust	lb.	.04½ @	—
Barytes, southern off-color,	ton	20.00 @	—
Western, prime white,	ton	23.00 @	—
Basofor	lb.	.04¾ @	—
Blanc fixe, dry, f.o.b. works	lb.	.04¼ @	.04½
Carrara filler	lb.	.01½ @	—
Chalk, precipitated,			
extra light	lb.	.03½ @	.04¼
heavy	lb.	.02½ @	.03¼
Clay, China, domestic,	ton	15.00 @	16.50
imported	ton	16.25 @	23.25
Dixie	ton	22.00 @	32.00
Blue Ridge	ton	22.00 @	32.00
Fossil flour	ton	60.00 @	—
Glues, extra white	lb.	.30 @	.40
medium white	lb.	.20 @	.26
cabinet	lb.	.18 @	.30
cabinet low grade	lb.	.15 @	.18
common bone	lb.	.08½ @	.14
Graphite flake, bbls.	lb.	.05 @	.08
amorphous	lb.	.04 @	.10
Infusorial earth, powdered	ton	60.00 @	—
bolted	ton	65.00 @	—
Liquid rubber	lb.	.15 @	—
Mica, powdered	lb.	.15 @	—
Rotton Stone (powdered)	lb.	.02½ @	.04½
Silica (gold bond)	ton	31.00 @	—
Soapstone, powdered	ton	12.00 @	15.00
Starch, powdered corn	cwt.	2.70 @	2.75
Talc, domestic	ton	15.00 @	18.00
French	ton	25.00 @	32.50
French, high grade	ton	43.00 @	48.00
Italian	ton	47.00 @	58.00
Terra Alba	ton	20.00 @	25.00
Tripoli, white	ton	25.00 @	28.00
Whiting, commercial	cwt.	1.00 @	1.10
Quaker	ton	13.00 @	15.00
English cliffstone	cwt.	1.50 @	1.70
gilder's bolted	cwt.	1.10 @	1.25
Paris white American	cwt.	1.25 @	1.35
Wood pulp XXX	ton	32.00 @	—
" " X	ton	25.00 @	—
Zinc Oxide—			
5 per cent leaded		.06½ @	.06¾
10 per cent lead sulphate	lb.	.06¼ @	.06½
20 per cent lead sulphate	lb.	.06¼ @	.06½
35 per cent lead sulphate	lb.	.06¼ @	.06½

(Also see whites)

MINERAL RUBBER

Gilsonite	ton	65.00 @	—
Genasco (factory)	ton	60.00 @	—
Hard hydrocarbon	ton	32.00 @	42.00
Soft hydrocarbon	ton	30.00 @	35.00
Pioneer M.R.	ton	42.00 @	44.00
320 M. P. hydrocarbon (c. l. factory)	ton	50.00 @	65.00
300/310 M. P. hydrocarbon (c. l. factory)	ton	40.00 @	90.00
Synpro, granulated, M. R. (factory)	ton	54.00 @	68.00

SOFTENERS

Acids

Acetic, 28 per cent	cwt.	2.92 @	3.65
Cresylic, 97 p. c.	gal.	.60 @	.62
95 p. c.	lb.	.55 @	.57
Muriatic, 20 degrees	cwt.	1.10 @	1.25
Nitric, 36 degrees	cwt.	4.75 @	5.25
Sulphuric, 66 degrees	ton	14.00 @	16.00
60 degrees	ton	9.00 @	12.00
Tartaric, crystals	lb.	.32 @	—

Alkalies

Caustic soda, 76 p.c.	cwt.	3.45 @	3.75
Soda ash, 58 p.c.	cwt.	1.95 @	2.30

Oils

Castor, No. 3, bbls.	lb.	.12½ @	—
Corn, crude, bbls.	lb.	.08¾ @	—
refined	lb.	.10½ @	—
Chinawood, bbls.	lb.	.12¾ @	**.13**
Cottonseed,	lb.	.10 @	—
Glycerine, drums	lb.	.18½ @	.19
Linseed, domestic	gal.	.88 @	.90
imported	gal.	.85 @	.86
Palm, Niger		.06¼ @	.07
Lagos	lb.	.07 @	.07½
Peanut, domestic, crude	lb.	.11 @	.12
Petrolatum, amber	lb.	.04½ @	.04¼
dark amber	lb.	.03⅞ @	.03⅞
Pine, steam distilled	gal.	.80 @	.85
Rapeseed, refined	gal.	.78 @	.81
blown	gal.	.90 @	.95
Rosin, first rectified	gal.	.41 @	—
second rectified	gal.	.43 @	—
Tar, commercial	gal.	.31½ @	—
Soya Bean		.11½ @	—
Petrolatum, standard	lb.	.05 @	.08

Resins and Pitches

Cumar resin, hard	lb.	.09 @	.10
soft	lb.	.09 @	.10
Tar Retort	bbl.	10.00 @	11.00
kiln burned	bbl.	11.00 @	12.00
Pitch, Burgundy	lb.	.04½ @	.06
coal tar	ton	.01½ @	—
pine tar		.03½ @	—
Rosin, grade K	bbl.	7.75 @	—
Strained	bbl.	7.50 @	—
Shellac, fine orange	lb.	.90 @	—

Solvents

Acetone, drums	lb.	.20 @	.23
Alcohol, denatured,			
No. 1 bbls.	gal.	.34 @	**.38**
Benzol, 90 per cent	gal.	.27 @	**.32**
pure	gal.	.30 @	**.35**
Carbon bisulphide,	lb.	.06¾ @	.07
tetrachloride	lb.	.09½ @	**.10⅛**
Dimethylaniline	lb.	.38 @	—
Motor gasoline,			
steel bbls.	gal.	.24 @	—
Naptha, V. M. & P.	gal.	.24 @	—
Toluol, pure	gal.	.30 @	**.35**
Turpentine, spirits	gal.	1.65 @	—
wood	gal.	1.55 @	—

Waxes

Beeswax	lb.	.42 @	.45
Carnauba, No. 1	lb.	.20 @	—
Ceresin, white	lb.	.12 @	—
Bayberry	lb.	.20 @	**.24**
Montan, crude	lb.	.03½ @	.04
Ozokerite, black	lb.	.18 @	.20
green	lb.	.25 @	.26
Paraffine	lb.	.02¾ @	.04
Sweet wax	lb.	.12 @	—

SUBSTITUTES

Black	lb.	.07 @	.14
White	lb.	.08 @	.16
Brown	lb.	.10 @	**.15**
Brown factice	lb.	.07 @	.15
White factice	lb.	.08½ @	.15

VULCANIZING INGREDIENTS

Black hyposulphite	lb.	.28 @	.30
Sulphur chloride (jugs)	lb.	.13½ @	.15
" " (drums)	lb.	.08 @	.10
Sulphur flour (bbls.)	cwt.	2.55 @	3.10
(bags)	cwt.	2.30 @	2.70
100 per cent pure (superfine)	cwt.	2.60 @	3.00
Sulphur, 100 per cent pure, Bergenport brand (bags)	cwt.	2.30 @	2.60
(bbls.)	cwt.	2.55 @	2.90

Barytes—There seems to be no disposition on the part of producers to advance prices as the result of the new tariff law and Western prime continued at $23 a ton, f.o.b., point of production, package included. The demand has been excellent and the tone of the market is firm.

Lithopone—Stocks in first hands are very small and the demand keeps pace with the large increase in production. Imported material has not been coming in as freely since the new tariff law went into effect. The increase in the price of zinc has led to some talk of an increase in price but domestic continued to be quoted at 6 cents a pound in bags and 6¼ cents in barrels carlots. Imported was quoted at 6½ cents.

Carbon Bisulphide—Some makes of carbon bisulphide were advanced to 7½ cents per pound for spot goods but round lots could be had for 6¾ cents to 7 cents.

Zinc Oxide—There was excellent buying of this material by the tire manufacturers and with the good demand from other quarters an active market for some time to come is expected. Quotations follow: French process, red seal in barrels carlots, brought 9 cents a pound; in less than carlots 9¼ cents; American process, bags, 7 cents a pound; barrels, carlots, 7½ cents; less than carlots, 8 cents. 5 per cent leaded carlots, 6½ cents per pound; 10 to 35 per cent, carlots, 6¼ cents.

Litharge—The demand is well up to the season and promises to continue active for some time to come. Casks advanced from 9 cents a pound to 9.15 cents. Kegs, 100 pounds and less than 500 pounds, were quoted at 12¾ cents per pound; 500 to 2000 pounds, 11½ cents and 2000 pounds to 10,000 pounds, 11 cents.

Blanc Fixe—There was no change in prices and the demand continues quite active. Dry brought 4¼ to 4½ cents a pound and pulp $40 to $50 a ton.

Soda Ash—There has been an unusually active demand for this material, a demand which has continued each month since summer. And yet with continuous demand and producers operating at production there has been no advance in prices. 58 per cent, light, in bags, continues at $1.75 to $1.95 and in barrels, $1.95 to $2.30. No announcement was made of contract prices for 1923.

Caustic Soda—As in the case of soda ash producers have been operating to capacity to meet the demand. Dealers quoted $3.75, ex-store, basis 76 per cent, for standard brands for domestic consumption.

Whiting—The market for whiting was active with the demand up to the season. Commercial is quoted at $1.00 a hundred pounds; gilders bolted, $1.10; English cliffstone, $1.50 and American paris white, $1.25.

Talc—The demand for domestic material and also for imported, notwithstanding the increased duty, continues good with prices as follows: Domestic, $15 to $18 per ton; French, $25 to $32.50 and Italian, $47 to $58.

Crude Rubber

NEW YORK, Nov. 3, 1922

SINCE spot rubber touched 23 cents a pound more than two weeks ago, following the London cable that the Stevenson restriction-of-production plan would be put into effect Nov. 1 by the British colonial governments, the price in this market has recessed but little. At this writing first latex and ribbed smoked sheet are quoted at 22½ cents, with a firm undertone and a fairly steady demand from buyers. The general feeling in the market is that there will be little or no recession from the current price level for some time to come; indeed, spot prices of standard grades may go to 25 cents any day now. There are some optimistic "bulls" who are talking 30-cent rubber and they may not be poor prophets at that, for London closed at 12 pence yesterday and with the restriction scheme in full effect, as it is, 15 pence is an immediate possibility.

The colonial legislatures of Ceylon, Straits Settlements, and the Federated Malay States, it is understood, have officially approved the plan laid before them by the British Colonial Office committee headed by Sir James Stevenson and the scale of export duties, percentages of production permitted for export, and rules for local committees are now in full force. By this time everyone in the rubber industry, from plantation grower to tire and shoe maker in the factory, is probably familiar with the details of the plan which bids fair to stabilize every branch of the business and place it on the road to prosperity and economic independence.

Manufacturers are showing more interest in purchases of crude rubber at the present price levels, as they realize that there is going to be hardly any reaction for a long time and if they do not place orders now they are likely to pay more in the coming months. Factory consumption of raw rubber is holding up very well, better than was anticipated by importers and dealers. Most of the factory demand is for tires and tubes, and weather conditions throughout the country have been favorable to the consumption of these two products because more cars have been in use for longer periods of time than in former years. Also, as we pointed out in the last issue, the lower prices for cars and improved condition of the highways have been additional factors favoring the tire manufacturers, hence the greater consumption of crude rubber.

All of the Plantation and Para grades are firm, and there has been some advance in the Pontianacs. Balatas are limited in supply and prices remain about as they were.

Quotations as of this date are practically as follows:

	BUYERS' OFFERS
Plantations	
Ribbed Smoked Sheets	.22¼
First Latex, spot	.22¼
November/December	.22⅝
January/March	.23¼
April, May, June	.23⅜
Amber Crepe No. 1 spot	.22¼
Amber Crepe No. 2 spot	.21¾
Amber Crepe No. 3 spot	.21¼
Light Clean Thin Brown Crepe	.21½
Commercially Clean Thin Brown Crepe	.20½
Specky Brown Crepe	.20
Roll Brown Crepe, spot	.20
Paras	
Madeira Fine	.24½
Acre Fine	.24
Up-river Fine	.23¾
Up-river Medium	.20½
Up-river Caucho Ball (shipment)	.18
Up-river Coarse	.18
Islands Fine	.21½
Islands Medium	.19
Islands Coarse	.13½
Cameta	.13
Xingu Ball	.16
Tapajos Fine	.21¾
Pontianac	
Prime Pressed	.14
Plantation	.07½
Bangermassin	.08
Siak Gutta Percha	.16¼
Prime Macassar	2.75
Balata	
Panama Block	.40
Surinam Sheets	.68½
Columbia Block	.47½
Venezuela Block	.60

Reclaimed Rubber

NEW YORK, Nov. 3, 1922

The advance and continued firmness in the crude rubber market is reflected in the rise in boots and shoes and other standard reclaims, for the first time in months. This market seems to be waking up at last from its long Rip Van Winkle sleep and every reclaimed rubber plant in the country is showing signs of activity, some of them having passed the fifty per cent of normal basis.

Quotations of this date are nominally as follows:

Standard Reclaims			
Floating	.13	@	.13¾
Friction	.12¾	@	.14
Boots and Shoes	.10½	@	.11
Boots and Shoes (washed)	.13¼	@	.13¾
Mechanical	.08	@	.10
Hose	.10	@	.11
Tires, truck	.09	@	.10
Tires, auto	.09	@	.10
White	.12	@	.13

Scrap Rubber

NEW YORK, Nov. 3, 1922

The feature of this market since our last report was the big advance of standard white auto tires from $12 to $20 a ton, the reason being the scarcity of this article. It appears that most of the tires being used now have black treads and sidewalls, and as a result white auto scrap is in very limited supply. The market in general is fractionally higher than two weeks ago.

Quotations of this date are as follows:

Auto tire peelings	.00¾	@	—
Standard White auto ....ton	20.00	@	—
Mixed auto .....ton	8.00	@	10.00
Bicycle tires	.00⅝	@	.00½
Clean solid truck tires	.00¾	@	.01
Boots and shoes	.02¾	@	.03
Arctics, trimmed	.01⅜	@	.02
Arctics, untrimmed	.01¼	@	.01⅜
Inner tubes, No. 1	.03	@	.03¼
Inner tubes, compounded	.02¼	@	.02½
Inner tubes, red	.02⅝	@	.02⅞
Battery jars, clean hard rubber	.01	@	.01¼
Heels and pads	Nominal		
Black mixed	Nominal		
Garden Hose	.00¾	@	.00½
Air brake hose	.00¼	@	.00⅝
Red packing	.00½	@	.00⅝
White mixed rubber	.00¼	@	.00¾
White druggist sundries	.01	@	.01¼

American Rubber Patents

1,424,802 Thomas H. Channon, Fitzroy, Melbourne, Victoria, Australia. Manufacture of Resilient Tires and Apparatus therefore.

1,425,356 George Henry Allden, Folkstone, England. Tread Band for Pneumatic Tires.

1,425,085 John R. Gammeter, Akron, Ohio. Method and Apparatus for making cushion tires.

1,426,218 Arthur E. Rope, Brooklyn, N. Y. Rubber Heel.

1,426,198 Frederick R. Keith, Randolph, Mass. Rubber Heel and Method of Making the Same.

1,426,296 James H. S. Kerr, Toronto, Ontario, Canada. Rubber Mat.

1,425,530 Alexander McLennan, Ross, England. Process for the Treatment of Leather with India Rubber.

1,425,668 Frank L. Marshall, Newton Center, Mass. Tire.

1,425,788 Franc D. Mayer, Chicago, Ill. Tire.

1,425,693 Harry Raflovich, Buffalo, N. Y., assignor, by mesne assignments to Slohm Tire &Mould Co. Inc., a Corporation of New York. Tire Mold.

1,425,925 Laurin L. Williams, Oneida, Kansas. Tire Patch.

1,426,005 Fred Brown Pfeiffer, Akron, Ohio. Pneumatic Tire.

1,425,812 Edward J. Turek, St. Louis, Mo. Pneumatic Tire.

1,426,108 Daniel M. Rothenberger, Leesport, Pa., assignor of one-third to Ephraim P. Wanner and one-third to William M. Fryermuth, both of Reading, Pa. Resilient Tire.

1,425,733 Hugh A. Wilson, Mankato, Minn. Deflated-Tire Signal.

1,427,622 Vincent Nave, Providence, R. I. Tire.

1,427,302 Austen J. Kloneck, New York, N. Y. Tire for Vehicles.

1,427,331 Frederick W. Sherwood, Brooklyn, N. Y. assignor to Kelly Springfield Tire Company, New York, N. Y., a corporation of New Jersey. Resilient Vehicle Tire.

1,427,707 John Andrew Villochi, Easton, Pa., assignor of one half to Louis J. Villochi, Easton, Pa. Tire Rim.

1,427,092. Melville Clark, Chicago, Ill. Vehicle-Wheel Tire.

1,427,528 Alexander German, Akron, Ohio. Core for forming Automobile Tires.

1,427,277 Edward Fetter, Baltimore, Md. Self-Healing Tube.

1,428,526 Charles E. Bardley, Montclair, N. J., and Joseph G. Coffin, Hempstead, N. Y., assignors to General Rubber Co. a Corporation of New Jersey. Process and Apparatus for Treating Latex.

1,429,031 Paulli Harder, Copenhagen, Denmark. Puncture-Healing Tube.

1,428,524 Herman L. Beal, Brookline, Mass. Rubber Heel.

1,429,209 Vratislav Kubelka, Brooklyn, N. Y. Tire.

1,428,817 Herbert H. Swan, Grand Rapids, Mich., assignor to Grand Rapids Tire and Rubber Corp., Grand Rapids, Mich., a corporation of Delaware. Tire.

1,428,752 James L. Butler, Akron, O., assignor to The B. F. Goodrich Co., New York. Method and Apparatus for Making Tire Casings.

1,428,719 Washington D. Teller, Wasepi, Mich. Cushion Tire.

1,428,571 Herbert N. Wayne, Washington, D. C. Fibrillous Tire.

1,428,726 Nathaniel G. Warth, Gallipolis, Ohio. Pneumatic Tire.

1,428,979 Edward D. Putt, Akron, Ohio, assignor to The Firestone Tire and Rubber Co., Akron, Ohio. Tire-Stripping Machine.

1,429,015 George W. Bolser, Cleveland, Ohio. Inner Tube for Tires.

1,428,570 Herbert N. Wayne, Washington, D. C. Self-Sealing Inner Tube for Automobile Tires.

1,429,673 Gustav Bormann, Hanover, Germany. Rubber Heel.

1,429,359 Harvey F. Maranville, Akron, Ohio, assignor to the Firestone Tire and Rubber Co., Akron, Ohio. Apparatus for Placing Washers in Rubber-Heel Molds.

1,429,831 Michael T. Barney, Los Angeles, Calif. Tire Mold.

1,429,385 Nathaniel G. Warth, Columbus, Ohio. Inner Tube for Pneumatic Tires.

1,429,512 Henry M. Lambert, Portland, Ore., assignor to Lambert Tire and Rubber Co., Portland, Ore., a Corporation of Arizona. Method of Manufacturing Cushion Tires.

1,429,377 Lawrence A. Subers, Lakewood, Ohio. Mold for Transverse and Annular Pneumatic Tires.

1,430,100 Lawrence O. Mitchell, Kansas City, Mo. Tire.

1,430,436 Martin S. Corbett, Glassboro, N. J. Automobile Tire.

1,430,236 John George Aulsebrook, Kitchen, Lancaster, England. Pneumatic Tire.

Trade Marks Applied For

[The following are trade-mark applications pertinent to our field pending in the United States Patent Office which have been passed for publication and are in line for early registration unless opposition is filed promptly. For further information address National Trade-Marks Company, Barrister Building, Washington, D. C. or Bush Building, 130 West 42 Street, New York, trade-mark specialists. As an additional service feature to its readers this Journal gladly offers to them an advance search free of charge on any mark they may contemplate adopting or registering.]

FLEXATOR—No. 160,776. Thomas G. Plant Company, Boston, Mass. For boots, shoes, and slippers of leather, rubber, felt, silk cloth or other fabric construction.

NEW STEP AIR—No. 162,793. Pasquale Altruda. Providence, R. I. For rubber heels.

PLAYPROOF—No. 162,433. A. I. Namm & Son, Inc., Brooklyn, N. Y. For chidlren's shoes made of leather, rubber, canvas, and combinations of these materials.

"999"—The Oldfield Tire Company, Akron, O. For resilient vehicle tires and inner tubes.

SAVAGE GRIP—No. 117,379. William G. Hennenhofer, doing business as Savage Grip Sales Company, Denver, Colo. For patches for fabric tires and inner tubes.

PREMIER—No. 163,676. The Fisk Rubber Company, Chicopee Falls, Mass. For rubber tires for bicycles, carriages, and automobiles.

VERIBEST above letters S. P. H. within shield. No. 148,766. Strevell-Paterson Hardware Co., Salt Lake City, Utah. For blow out patches, fruit jar rubbers, and garden hose.

VACU-GRIP—No. 161,944. A. J. Stephens Rubber Co., Kansas City, Mo. For sub-casings of fabric, rubber and gum for tires.

RECTANGULAR frame. No. 147,036. The Mechanical Rubber Company, New York City, Chicago, Ill., and Cleveland, O. For jar rings, rubber belting, hose and packing.

JUMBO BRAND on picture of globe surmounted by an elephant saddled. No. 151,101. The Schoellkopf Co., Dallas, Tex. For rubber and leather heels and soles.

MAGNA—No. 162,047. Phillips Patents Limited, London, England. For india-rubber tips and pads for heels of boots and shoes, tips and pads being sold separately.

E in center of diamond. No. 161,287. United States Rubber Company, New Brunswick, N. J. and N. Y. C. For hose made of cotton and rubber.

HICKORY—No. 148,623. A. Stein & Company, Chicago, Ill. For elastic webbing and shirred elastic ribbon.

A TO Z COMFORT—No. 155,210. Lane Brothers Company, Boston, Mass. For shoes of a combination of leather and rubber.

IDEAL—No. 161,491. Lynch Heel Company, Chelsea, Mass. For rubber heels.

CRADLE TO COLLEGE—No. 160,892. The H. W. Merriam Shoe Company, Newton, N. J. For shoes made of leather, rubber, fabric, and combination of same.

PATRICIAN—No. 161,795. The Seamless Rubber Company, Inc., New Haven, Conn. For rubber combs.

ARCH GUIDE—No. 143,996. The Pietzuch Surgical Wonder Arch Guide Heel Company, Cincinnati, O. For rubber heels.

KARLODE—No. 160,590. Leonard R. Carley, Watertown, Conn. For rubber shoes.

REX-BLAK—No. 163,945. Rex-Hide Rubber Manufacturing Company, East Brady, Pa. For vulcanizable material consisting of a mixture of rubber, glue, and carbon black sold in an unvulcanized condition and used in the manufacture of rubber products.

REX-HIDE—No. 163,946. Rex-Hide Rubber Manufacturing Company, East Brady, Pa. For vulcanizing material consisting of a mixture of rubber, glue, and carbon black sold in an unvulcanized condition and used in the manufacture of rubber products.

LYNX—No. 163,057. Panther Rubber Manufacturing Company, Stoughton, Mass. For rubber heels.

PANCO—No. 163,056. Panther Rubber Manufacturing Company, Stoughton, Mass. For rubber soles and taps.

PANCORD—No. 163,055. Panther Rubber Manufacturing Company, Stoughton, Mass. For rubber heels.

TIGER—No. 163,054. Panther Rubber Manufacturing Company, Stoughton, Mass. For rubber heels.

JOHANSEN'S FEETURE ARCH—in white letters on black oval. No. 160,194. Johansen Bros. Shoe Company, St. Louis, Mo. For shoes of leather or a combination of leather, rubber and fabric.

VEE-ROUND—No. 140,431. Durkee-Atwood Co., Minneapolis, Minn. For power-transmitting belts of rubberized fabric.

KEYSTONE above picture of a keystone. No. 161,385. Frank Redman, N. Y. C. For rubber heels.

New Incorporations

ALABAMA

Posner-Ormond Tire Co., Inc., to deal in automobile tires and accessories. $2,000. B. Ormond, president; N. L. Posner, secretary and treasurer; F. O. Denson, vice president —Birmingham, Alabama.

CANADA

Lion-Mead Rubber Co., Ltd., to manufacture the Mead valve and other accessories. $2,500,000. Herman H. Lang, president; J. U. Archambault, M. D., vice president; J. A. Valin, treasurer. Principal office, 59 Main street, Hull, Canada.

CALIFORNIA

Sylvester Rubber Corporation, to manufacture and deal in rubber heels and soles. $50,000. Incorporators: M. P. Martingoli, 461 Larkin street; S. D. Webb, 942 Geary street; B. Franklin, 34 Palm avenue—San Francisco, California.

Big Bear Tire Co., to deal in tires. $200,000. Incorporators: C. A. Vories, R. A. Mattice and F. N. Arnold—Los Angeles, California. Principal office, Los Angeles, California.

E. J. Todd, Inc., to deal in tires. $50,000. Incorporators: E. J. Todd and T. C. Hadden —New Haven, Connecticut; A. P. Adams, Great Barrington, Massachusetts. Principal office, 65 Whalley avenue, New Haven, Connecticut.

DELAWARE

The Lund-William Shoe Co., to manufacture rubber heels and soles. $1,250,000. R. L. Lund, president and treasurer; B. W. Williams, vice president and secretary. Principal office, St. Louis. Missouri.

Allegheny Chemical Manufacturing Co., to deal in pigments, fillers and other chemicals. $100,000. Incorporators: T. L. Croteau, M. A. Bruce, C. H. Blaske—Wilmington, Delaware. Delaware agent, Corporation Trust Co. of America, Wilmington, Delaware.

Indemand Products Corporation, to deal in rubbber, celluloid, fabric and other material. $100,000. Incorporators: M. M. Lucey, L. C. Browne, L. S. Dorsey—Wilmington, Delaware. Delaware agent, Colonial Charter Co., 927 Market St., Wilmington, Delaware.

KANSAS

Consumers Rubber Co., to deal in tires and rubber goods. M. E. Palmer, president; A. H. Palmer, vice president; F. C. Starr, secretary and treasurer. Principal office, 222 West Sixth avenue, Topeka, Kansas.

MASSACHUSETTS

Auto Tire & Vulcanizing Co., Inc., to deal in automobile tires and accessories. $10,000. Incorporators: D. Frank and L. Frank, 235 Saratoga street, East Boston, Massachusetts; D. J. Davis, 69 South Elm street, Lynn, Massachusetts. Principal office, Boston, Massachusetts.

Marlborough Tire & Accessory Corporation, to deal in tires and accessories. $5,000. Incorporators: I. Frank, Villa Nova, Howardville, Maryland; J. Frank, 114 West Mount Royal avenue, Baltimore, Maryland; B. Frank, Marlborough apartments, Baltimore, Maryland. Principal office, Baltimore, Maryland.

NEW JERSEY

Metalastic Co., Inc., to manufacture packing for valves and machinery. $100,000. Incorporators: F. Durgan, 231 West 23rd street; H. T. Stewart, 422 West 115th street —New York City; F. J. Reuter, 66 Waring Place, Yonkers, New York; F. H. White, 336 Park Place, Brooklyn, New York. Principal office, 75 Montgomery street, Jersey City, New Jersey.

Duratex Corporation, to manufacture rubber and textile products. Incorporators: A. W. Britton, S. B. Howard and R. K. Thistle—65 Cedar street, New York City.

NEW YORK

Holcombe Rubber Co., Inc., to deal in tires. $500. Incorporators: H. W. Holcombe and S. Lamont, Jr.—Yonkers, New York. R. W. Patrick, New York City.

THE RUBBER AGE BUYERS GUIDE

ACCELERATORS
Daigger, A., & Co., Chicago, Ill.
Harshaw, Fuller & Goodwin Co., The, Cleveland, O.
National Aniline & Chemical Co., Inc., New York.
Rubber Service Laboratories Co., The, Akron, O.
States Metals Co., Inc., New York.
Wishnick-Tumpeer Chemical Co., Chicago.

ACCUMULATORS
Adamson Machine Co Akron, O.
Akron Rubber Mold & Machine Co., Akron, O.
Allen Machine Co., Erie, Pa.
Birmingham Iron Foundry, Derby, Conn.
Wellman - Seaver - Morgan Co., Cleveland, Ohio.

ACIDS
Daigger, A., & Co., Chicago, Ill.
Harshaw, Fuller & Goodwin Co., Cleveland, O.
National Aniline & Chemical Co., Inc., New York.
Wishnick-Tumpeer Chemical Co., Chicago.

ACID TANKS
Birmingham Iron Foundry, Derby, Conn.
Devine, J. P., Co., Buffalo, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.

AIR & STEAM METAL BAGS
Allsteel Ridewell Tire & Rubber Co., Dayton, Ohio.

AIR BRAKE HOSE
United States Rubber Co., New York.

AIR GOODS
Davol Rubber Co., Providence, R. I.
Hodgman Rubber Co., Tuckahoe, N. Y.
United States Rubber Co., New York.

AIR MATTRESSES
Davol Rubber Co., Providence, R. I.
Hodgman Rubber Co., Tuckahoe, N. Y.
United States Rubber Co., New York.

AIRPLANE AND BALLOON CLOTHS
United States Rubber Co., New York.
Hodgman Rubber Co., Tuckahoe, N. Y.

ALBA WHITING
Daigger, A., & Co., Chicago, Ill.
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Industrial Chemical Co., New York.
Wishnick-Tumpeer Chemical Co., Chicago.

ALCOHOL
Daigger, A., & Co., Chicago, Ill.
Harshaw, Fuller & Goodwin Co., Cleveland, O.
Tyler Patterson Co., Clev'd, O.
Wishnick-Tumpeer Chemical Co., Chicago.

ALUMINUM FILLER
Daigger, A., & Co., Chicago, Ill.
Wishnick-Tumpeer Chemical Co., Chicago.

ALUMINUM FLAKE
Aluminum Flake Co., Akron, Ohio.
Butcher, L. H., Co., New York.
Fulper, Edward B., Trenton, N. J.
Harshaw, Fuller & Goodwin Co., Cleveland, O.
Rubber Service Laboratories Co., The, Akron, O.

AMMONIA AQUA
Daigger, A., & Co., Chicago, Ill.
Laidlow, Kelly & Co., New York.
Tyler Patterson Co., Clev'd, O.
Wishnick-Tumpeer Chemical Co., Chicago.

ANGLE THERMOMETERS
Taylor Instrument Companies, Rochester, N. Y.

ANILINE OIL
Butcher, L. H., Co., New York.
Daigger, A., & Co., Chicago, Ill.
Fulper, Edward B., Trenton, N. J.
Klipstein, A., & Co., New York.
National Aniline & Chemical Co., Inc., New York.
Tyler Patterson Co., Clev'd, O.
Wishnick-Tumpeer Chemical Co., Chicago.

ANILINE OIL PLANTS
Devine, J. P., Co., Buffalo, N. Y.

ANOLIDE
National Aniline & Chemical Co., Inc., New York.

ANTIMONY, SULPHURETS
Butcher, L. H., Co., New York.
Daigger, A., & Co., Chicago, Ill.
Fulper, Edward B., Trenton, N. J.
Harshaw, Fuller & Goodwin Co., Cleveland, O.
States Metals Co., Inc., New York.
Rare Metal Products Co., Belleville, N. J.
Tyler Patterson Co., Clev'd, O.
Typke & King, Mitcham, England.
Wishnick-Tumpeer Chemical Co., Chicago.

APRONS—RUBBER
Hodgman Rubber Co., Tuckahoe, N. Y.
Miller Rubber Co., Akron, Ohio.

ARTIFICIAL RUBBER
Carter Bell Mfg. Co., New York.
Stamford Rubber Supply Co., Stamford, Conn.

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Butcher, L. H., Co., New York.
Daigger, A., & Co., Chicago, Ill.
Fulper, Edward B., Trenton, N. J.
Harshaw, Fuller & Goodwin Co., Cleveland, O.
Tyler Patterson Co., Clev'd, O.
Wishnick-Tumpeer Chemical Co., Chicago.

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The Rubber Products Co., Barberton, Ohio.

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